the OIL AND GAS JOURNAL

THE BIT THAT CUTS DOWN THOSE COSTLY ROUND TRIPS

Here's a bit that will drill more hole faster in hard, abrasive rock than any known tool! It has proved itself in West Texas, Oklahoma, and Rocky Mountain areas.

In many cases, the HUGHESET bit is drilling 3 to 10 times the footage normally drilled with regular hard formation bits in cherty and hard quartzitic formations.

Not only does the HUGHESET bit drill faster, it stays on bottom longer . . . making hole. The result is a material reduction in those time-killing, costly round trips.

Your local Hughes representative will be glad to advise you as to the conditions under which the HUGHESET bit can be run to the best advantage.

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 DECEMBER 8, 1952

GREETINGS from HALLIBURTON

THE OIL AND GAS
JOURNAL
Vol. 51, No. 31

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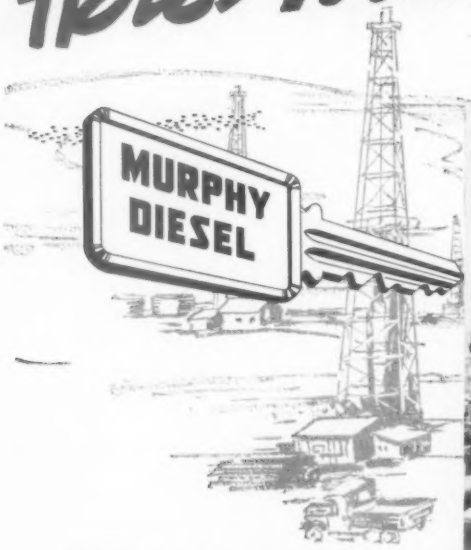
HERE'S YOUR KEY to bigger drilling profits



National 50 drawworks powered by two Murphy Diesels each rated at 190 H.P., continuous, 210 H.P. intermittent. It is owned by Hulme Drilling Co., Great Bend, Kans. and is shown here near Hutchinson, Kans.

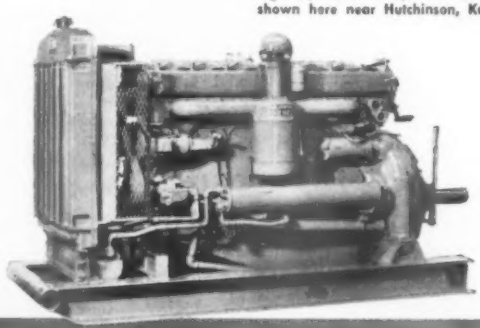
THERE are a lot of factors that determine how much profit you'll get out of any drilling operation, but they all depend on power. Without good, reliable power, the best equipment and the best drilling "know-how" can be wasted.

You can put an end to the power problem with Murphy Diesel power. Murphy Diesels deliver more usable heavy duty drilling power at a lower cost per horse power hour than any other engine of comparable size. Their proved record of dependability and long life adds more to a rosy profit picture.

The reasons why Murphy Diesels are able to deliver more power, greater economy and dependability and longer life are given in the booklet *"10 Questions to Ask a Diesel Engine Salesman"*. Ask your Murphy Diesel Dealer for a copy or write:

MURPHY DIESEL COMPANY

5305 W. Burnham St. Milwaukee 14, Wisconsin
Tulsa Office—Sales, Parts and Service:
113-117 South Elwood Street, Tulsa, Oklahoma



MURPHY DIESEL

Heavy Duty Power For The Oilfields

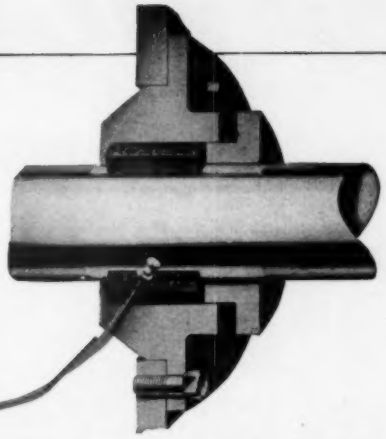
Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 226 H.P., 1200 and 1400 RPM. Generator Sets, 60 to 140 K.W. Dual-Fuel Engines, 135 to 180 H.P. Also Crude Oil Burning Engines.

Sales Parts and Service: Los Angeles and Bakersfield, California; Denver, Colorado; Evansville, Indiana; Great Bend, Kansas; Monroe and New Orleans, Louisiana; Butte and Great Falls, Montana; Albuquerque, New Mexico; Amarillo, Dallas, Houston, Lubbock and San Antonio, Texas; and Edmonton, Alberta, Canada.

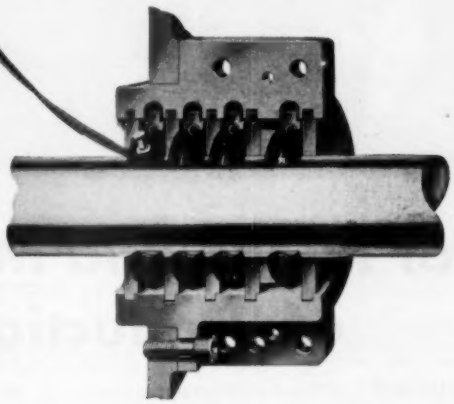
249

COPPUS TURBINES

offer you a choice of packing rings



STANDARD METALLIC RING PACKING — Made of high grade asbestos cores encased in specially treated lubricated aluminum foil. Recommended as a low-friction, long-service packing for steam temperatures up to 850 F and back pressures up to 50 lb. Adjustable packing glands keep leakage at minimum. Easy access to packing rings.



OPTIONAL CARBON RING PACKING — Consists of three carbon packing rings on the pressure side and one beyond the leak-off section. Each ring has three segments held together by a stainless steel garter spring. For back pressures up to 75 lb. Standard for vacuum or gas operation, or when leak-off is desired.

Heavy chrome plating on shaft at stuffing box is common to both types of Coppus packing.

Coppus Turbines ranging from 150 hp down to fractional in 6 frame sizes

FIT TURBINE COSTS TO HORSEPOWER NEEDS

When you buy turbines rated close to your exact horsepower needs, you save plenty of money. That's because turbines are generally priced in proportion to their size. The wide range of sizes of Coppus Turbines promises purchasing economy for you from the 150 hp size down to the smallest. As for operating and maintenance economies, you get them, too, from such other features as: greater number of manually operated valves for individual control of steam nozzles; replaceable cartridge-type bearing housings and others. For complete details . . .

WRITE FOR BULLETIN 135
COPPUS ENGINEERING CORPORATION
273 Park Avenue
Worcester 2, Mass.
Sales offices in THOMAS' REGISTER

COPPUS "BLUE RIBBON" TURBINES

SERVICE

that is saving dollars...

IN RECONDITIONING customer's pumps at "Oilwell's" Odessa, Texas, pump shop, old balls and seats are carefully checked for accuracy of mating under vacuum.

COMPLETELY NEW "Oilwell" pumps are custom assembled to meet the requirements of individual wells. Similar assembly practices are followed in reconditioning customer's pumps, regardless of make.

...for MORE and MORE Operators of Production Leases

METICULOUS CARE is a priceless ingredient in the services which "Oilwell's" Modern Subsurface Pump Shops are equipped to perform for operators of production leases.

This METICULOUS CARE assures the same high-precision exactness in the assembly of every new "Oilwell" pump—DI-HARD, HI-BRIN, CHROM-OLY-HARD, NICKEL-IRON or SILVERLINE—that went into its manufacture. The correct combination of component parts can now be selected to build the style of pump required to meet specific conditions in each individual well—with proper contact stroke length, plunger working clearance, number and type of balls and seats and the quality and type of all accessary items. This makes each new "Oilwell" pump a custom-assembled job.

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Why Not Visit . . . a local "Oilwell" Subsurface Pump Shop and discuss with the production equipment specialist there, your immediate pump problems?

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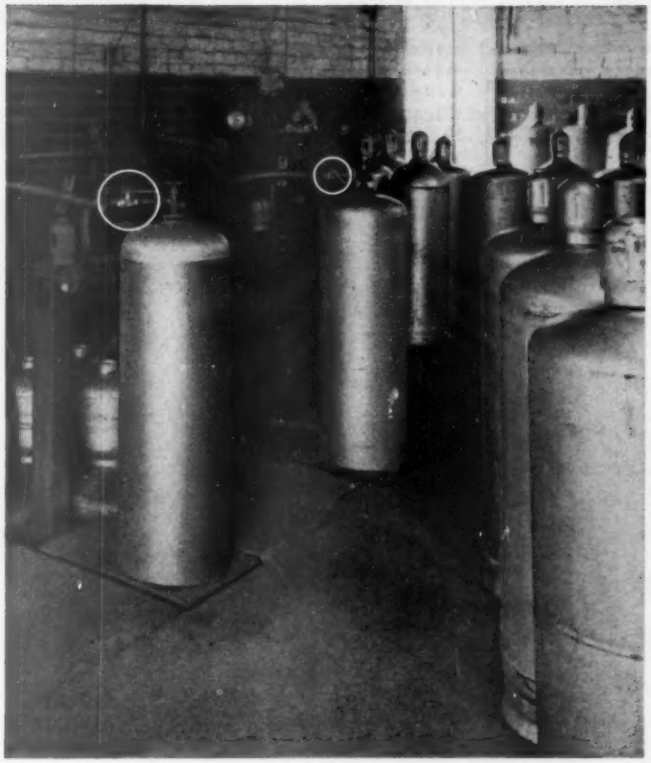


Big propane plant reports:

"Increased production and no maintenance"

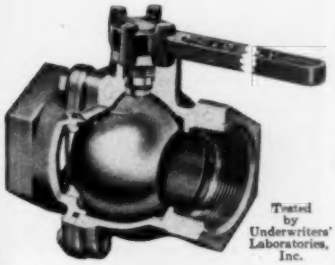
with these amazing new ball valves

One of many enthusiastic users of Rockwood Ball Valves, this large propane plant ships up to 400 tanks of bottled gas daily to householders. Valves are operated every two minutes during the day. The plant supervisor states their extra fast opening and closing, full *round* flow and tight seal makes them real production boosters and cost cutters . . . *and they need absolutely no maintenance!*

ROCKWOOD *FULL-FLOW* BALL VALVES

THE FLOW IS AS ROUND AS THE PIPE ITSELF

Safest, too! Because of their leakproof construction, Rockwood Ball Valves were selected as safest for handling inflammable gases on the Texas Transport Company's fleet of propane-butane trucks.



Tested by Underwriters' Laboratories, Inc.

4 BIG FEATURES FOR TOP PERFORMANCE

Full Round Flow . . . no change in shape or volume of the fluid stream . . . no turbulence . . . minimum friction loss.

Quick Opening And Closing . . . needs only a quarter turn, even under full pressure.

Resists Wear Longer . . . scratching, pitting and abrasion have little effect on the chrome-plated, floating bronze ball.

Stays Leakproof . . . in closed position, pressure of fluid automatically positions ball against synthetic rubber seat to form a tight seal.

Get the whole story of how this outstanding Rockwood development gives you more of what you want in valve performance. Mail the coupon today.

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ROCKWOOD SPRINKLER COMPANY
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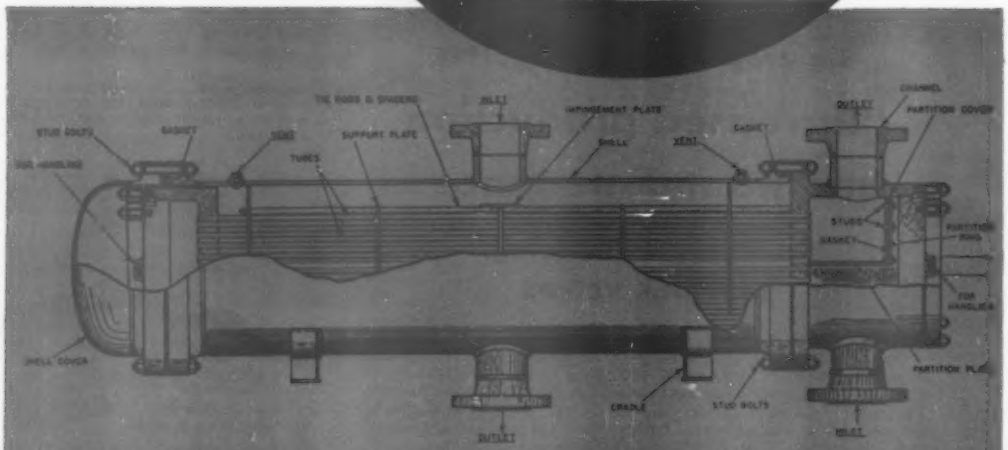
Heat Exchangers — with a difference

Long recognised as an aid to efficient industrial production, the modern Heat Exchanger operating through a wide range of temperatures and pressures can help towards increased production and lowered costs in *your* business. Many Industries, such as the Petroleum Refining and Chemical Processing, are obvious users of Heat Exchangers in one form or another ; important others can readily be found amongst the following: — PAPER MAKING · AIR CONDITIONING SHIPBUILDING · FOOD PROCESSING · POWER GENERATION · TEXTILE MANUFACTURE · WATER WORKS.

The matter may be urgent, delay can be costly. Harveys deal with enquiries immediately.

The skill of trained operatives combinedwithextensive shop facilities, and backed by Harveys experience in the application of Heat Transfer Equipment to Industry is at your service now.



The difference Harveys can offer is that, as Licensees of Lummus Company they can produce the Lummus "Multilok" Exchanger. This Heat Exchanger, developed for high pressure operation, is an exclusive design not available in other brands of Heat Transfer Equipment.

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HIGHLY RECOMMENDED

for low cost service

CRANE

IRON BODY—WEDGE DISC

Clamp Gate Valves

Crane Wedge Disc Clamp Gate Valves come in OS&Y, inside screw, and quick-opening patterns, all-iron or brass trimmed, screwed or flanged end. Sizes up to 4 in. Working pressures up to 150 psi saturated steam, 225 psi cold service.

Low in first cost, as well as in upkeep... and look at their wide utility—

Use Crane Clamp Gate Valves for steam; hot and cold water; crude, fuel, and lubricating oil; air, gas, and gasoline service.

Also in food and chemical process industries for caustic solutions, alkalies, corrosive chemicals, and gases.

You'll find Crane Clamp Gate Valves extra rugged, with a strong reinforced body and husky stem. Their compact design means a better fit for more places... a saving on piping in many cases. And because of the simplified clamp construction, these valves enjoy wide favor where frequent cleanout is essential. The bonnet assembly and wedge disc lift out easily—the body stays in the line. Reassembling is no problem for the bonnet joint always makes up tight and stays tight.

Wide choice of regular patterns, all-iron or brass trimmed. On inside screw all-iron valves, an improved self-draining bonnet prevents entrapment of line fluids in the bonnet—protects the threads, keeps the stem working smoothly. Send for Folder AD 1667 or ask your Crane Representative for full details.

The Complete Crane Line Meets All Your Valve Needs. That's Why
More Crane Valves Are Used Than Any Other Make!

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
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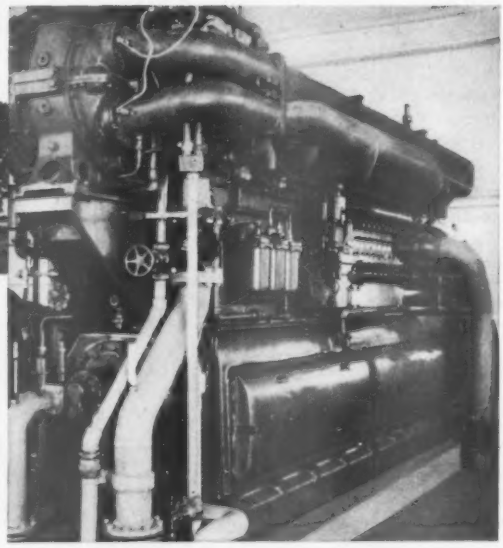
VALVES • FITTINGS • PIPE • PLUMBING • HEATING

165,000 hours of service completed by 28 Alco Diesels at 98½% availability

for Gulf Refining Company



Twenty-two years ago, Gulf Refining Company installed 28 Alco Diesel Engines on its new, 700-mile Tulsa-to-Spencerville Junction pipeline. Today, those 28 Alco Diesels have completed more than 165,000 hours of service and are operating at 98½% availability. And since 1941, when the output of the line was greatly increased, they have been in actual service an average of 97% of the time.

Pumping station superintendents throughout the United States and Canada specify Alco Standardized Diesels because of this kind of *proved* dependability——and because of these economy features:

- **Compactness**—for lower construction costs
- **Higher Engine Efficiency**—for lower fuel costs
- **Medium Speed**—for lower auxiliary equipment costs
- **Flexible Power Range**—for lower expansion costs

For the complete story on Alco Diesel Engines, contact your nearest American Locomotive Company Sales Office. You will find them in New York, Beaumont, Chicago, Cleveland, Houston, Kansas City, San Francisco, Schenectady and St. Louis.

ALCO DIESELS

THE MARK OF MODERN ENGINEERING

AMERICAN LOCOMOTIVE COMPANY

NEW!

a chemical injection valve that's made to give you

Constant Controlled Flow

This valve only goes where the going is roughest.

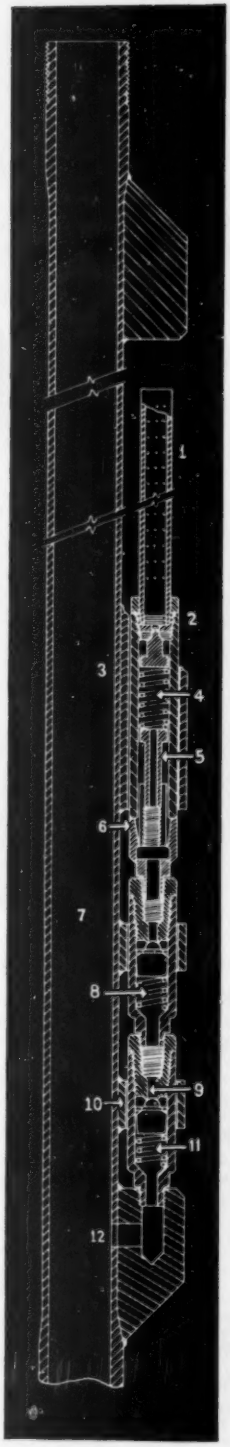
It is a chemical injection valve. It's put at the bottom of the well and it's put there to stay. It has to keep functioning even though exposed to *corrosion* by sour crude, hydrogen sulfide and brine . . . constantly. Its moving parts have to withstand *wear* — have to keep their tolerances indefinitely. Its three springs have to keep their resistance to *fatigue* so that, once set, the valve will admit the chemical at the predetermined rate, without losses . . . regardless of pressure surges in the tubing.

When the Macco Oil Tool Company designed this valve, they were faced with the problem of providing only materials that would conform to these requirements. That's why they made the valve entirely of Inco Nickel Alloys — Monel® and Inconel®.

Both Monel and Inconel offer protection against the severest oil field conditions. They resist corrosion by sour crude — even in hot wells, at high pressure. They protect against cutting action by gas and provide exceptionally good resistance to abrasion and erosion by entrained solids even at high velocities.

Right now, because so much is taken for defense, Monel and Inconel — like all Inco Nickel Alloys — are on extended delivery. However, by ordering your equipment well in advance, and including NPA rating and full end-use information, you'll improve your chances of getting delivery when you need it. And call on Inco's Technical Service any time you run into problems involving metals for oil field use. A brief note will bring you a prompt reply. No charge or obligation, of course. The International Nickel Company, Inc., 67 Wall Street, New York 5, N. Y.

Monel — Inconel...YOUR PARTNERS IN PROGRESS



All parts made of Monel and Inconel!

A VALUABLE TOOL FOR CORROSIVE WELLS.

The *Macco* Bottom-Hole Chemical Injection Valve assembly provides an effective method of inhibiting corrosion by adding controlled amounts of inhibitor to well fluids.

In operation, inhibitor is injected into the annulus down to a packer, and admitted to tubing through a valve. The valve is designed to inject the same amount of inhibitor as the pump supplies—regardless of the head of inhibitor present in the annulus or variable tubing pressures.

The *Macco* Valve is constructed of Monel and Inconel, two rugged Inco Nickel Alloys that have proved their value in making oil field equipment more resistant to corrosion, erosion, wear and fatigue. Additional information may be obtained directly from *Macco Oil Tool Company*, 1521 Prince, Houston, Texas, through whose courtesy the illustration and technical material on this page were supplied.

1. INCONEL SCREEN
2. INJECTOR VALVE PORT (5/16")
3. PROTECTOR SLEEVE
4. INCONEL STRESS EQUALIZED SPRING
5. ADJUSTABLE PEDESTAL FOR ADJUSTING LOAD RATE ON SPRING
6. INHIBITOR INJECTION VALVE
7. REGULAR TUBING SPACE (NIPPLE)
8. NORMALLY CLOSED CHECK VALVE
9. CHECK VALVE PORT (3/8")
10. PROTECTOR SLEEVE
11. NORMALLY CLOSED CHECK VALVE
12. MANDREL PORT (1/2")

INCO TRADE MARK

Dependable Communications —by the Bell System

In recent months the tens of thousands of miles of Bell System intercity private line services for pipe line, power and railroad companies were on the job 99.79 per cent of the time.

This high degree of reliability is made possible by a large force of trained specialists in the field. These men are on the job 24 hours a day, 365 days a year. When there is an interruption in service, they move in rapidly to restore it.

In most cases, they can quickly set up alternate routings in emergencies because of the Bell System's nationwide network of wire, cable and microwave.

• • •

For good, dependable communications get in touch with your nearest Bell Telephone Company representative. He will be glad to study your communications problems and requirements without charge and recommend service that will meet all of your needs.

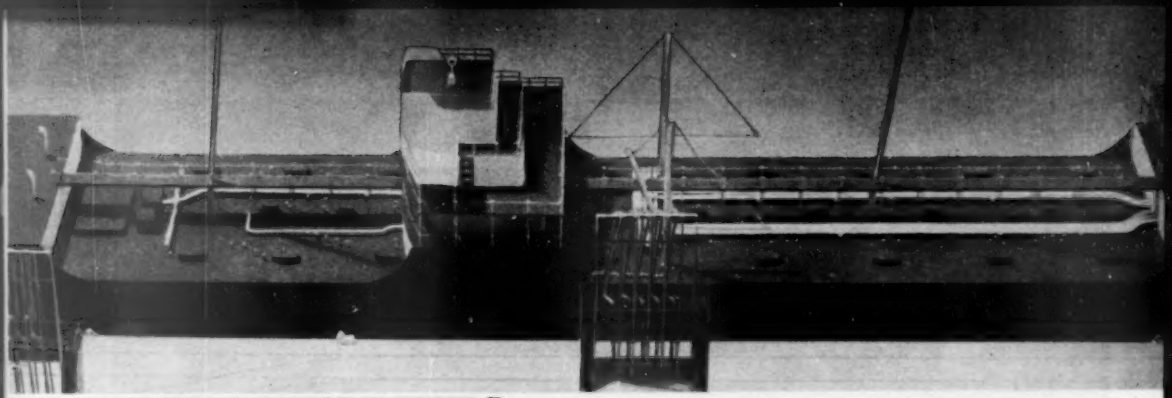
PRIVATE-LINE TELEPHONE

TELETYPEWRITER

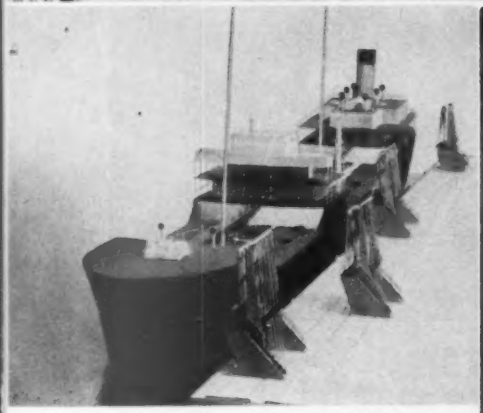
MOBILE TELEPHONE

METERING CHANNELS

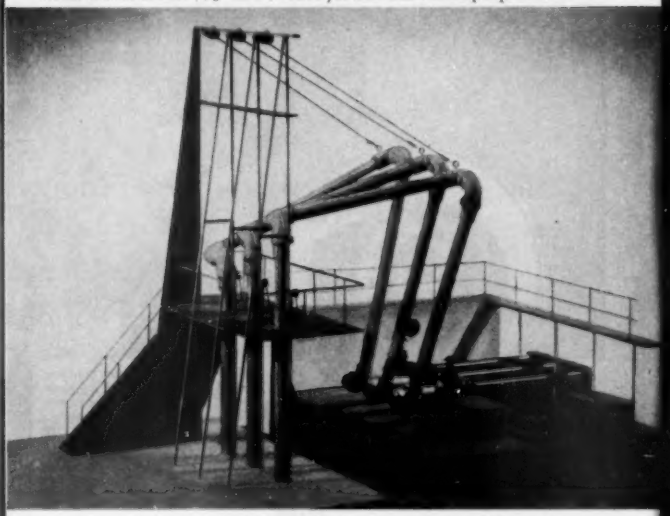
BELL TELEPHONE SYSTEM



Scale model tanker (⅛" to 1') made for demonstration purposes.



Loading racks provide multiple loading stations. Manifold lines under dock are easily connected to loading racks.

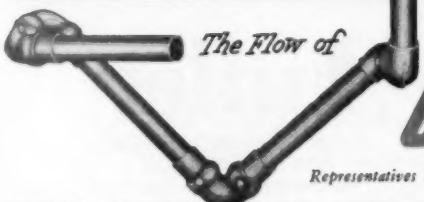


Larger model of a loading rack demonstrates flexibility of Chiksan aluminum marine and barge hose. Ship to shore connections can be easily handled by one man in a few minutes.

CHIKSAN Engineers Will Design To Your Order

A New Concept in Engineering Procedure

Designed and engineered to *your* particular needs and demands is the creed of Chiksan's Engineering and Research Development Division. • Whether it be a ⅜"swivel joint or an entire loading dock, Chiksan design engineers will work in close cooperation with your organization to find a practical solution to your problems. • Here, for example, is an illustration of how Chiksan solved the problems of a major petroleum refiner seeking to speed the loading of petroleum products from dock to tanker with the utmost in economy and safety. • If you have problems in the safe, economical, speedier conduct of fluids and gases through flexible lines, Chiksan will welcome the opportunity of working with you.



The Flow of Enterprise Relies on

CHIKSAN

Ball-Bearing Swivel Joints

Representatives in Principal Cities • Write for Catalog 51-C, Dept. 12-OGJ

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Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Chiksan Export Company (Subsidiary), Brea, California • Newark 2, N. J.

Five Fuller Rotary Two-stage Gas Boosters, each handling 1,770,000 S.C.F.D. from 10- to 120-psig. at 800 rpm, direct connected to V-12 Climax gas engines.

Motor-driven Fuller Rotary Single-stage Gas Booster . . . 570,000 S.C.F.D. at 1160 rpm.

Dependable Gas Boosting with FULLER ROTARY COMPRESSORS

For extra gas boosting capacity to plant or trunk level, Fuller Rotary Compressors can be spotted anywhere along gathering or supply lines where they operate efficiently, under the most adverse conditions, without constant supervision.

Fuller Compressors require little maintenance because only the rotor, blades and bearings move. No valves to leak or seats to grind. The blades automatically compensate for wear. Pulsation and vibration are reduced to a minimum. A simplified, direct drive eliminates power transmission losses. Call a Fuller engineer for the most efficient, economical way to boost pressure.

Fuller Compressors are available in a range of cylinders up to 3300 c.f.m. (at atmospheric intake) at normal speeds, with a reasonable variation in speed range; motor, engine or turbine drive.

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS
COMPRESSORS AND VACUUM PUMPS
FEEDERS, AND ASSOCIATED EQUIPMENT

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FULLER COMPANY, Catasauqua, Pa.
120 S. LaSalle St.—Chicago 3
420 Chancery Bldg.—San Francisco 4

PIONEERS OF HIGH-EFFICIENCY VANE-TYPE ROTARY COMPRESSORS

C-221

Fishtail...
Roller...
Drag...

AIRCO HARDFACE-LIFTING ADDS SUB-SURFACE TIME

More than twenty Airco Hardfacing rods are ready to help you beat today's replacement delay. Full equipment protection with Airco Hardfacing Alloys . . . for new parts and old . . . keeps you free of cut-backs, or loss of day to day production.

Parts and tools — fishtail bits . . . roller bits . . . core heads . . . wall scraper blades . . . drag type bits — stay on the job longer, even at peak production, their life extended many times with *Airco Hardfacing Alloys.*

No matter what your wear problem, it will pay you to look into Airco Hardfacing Alloys for your tools and parts. Any Airco representative will be glad to give you complete information. Write your local Airco office today or address Air Reduction Sales Company, Advertising Department, 60 East 42nd Street, New York 17, N. Y.

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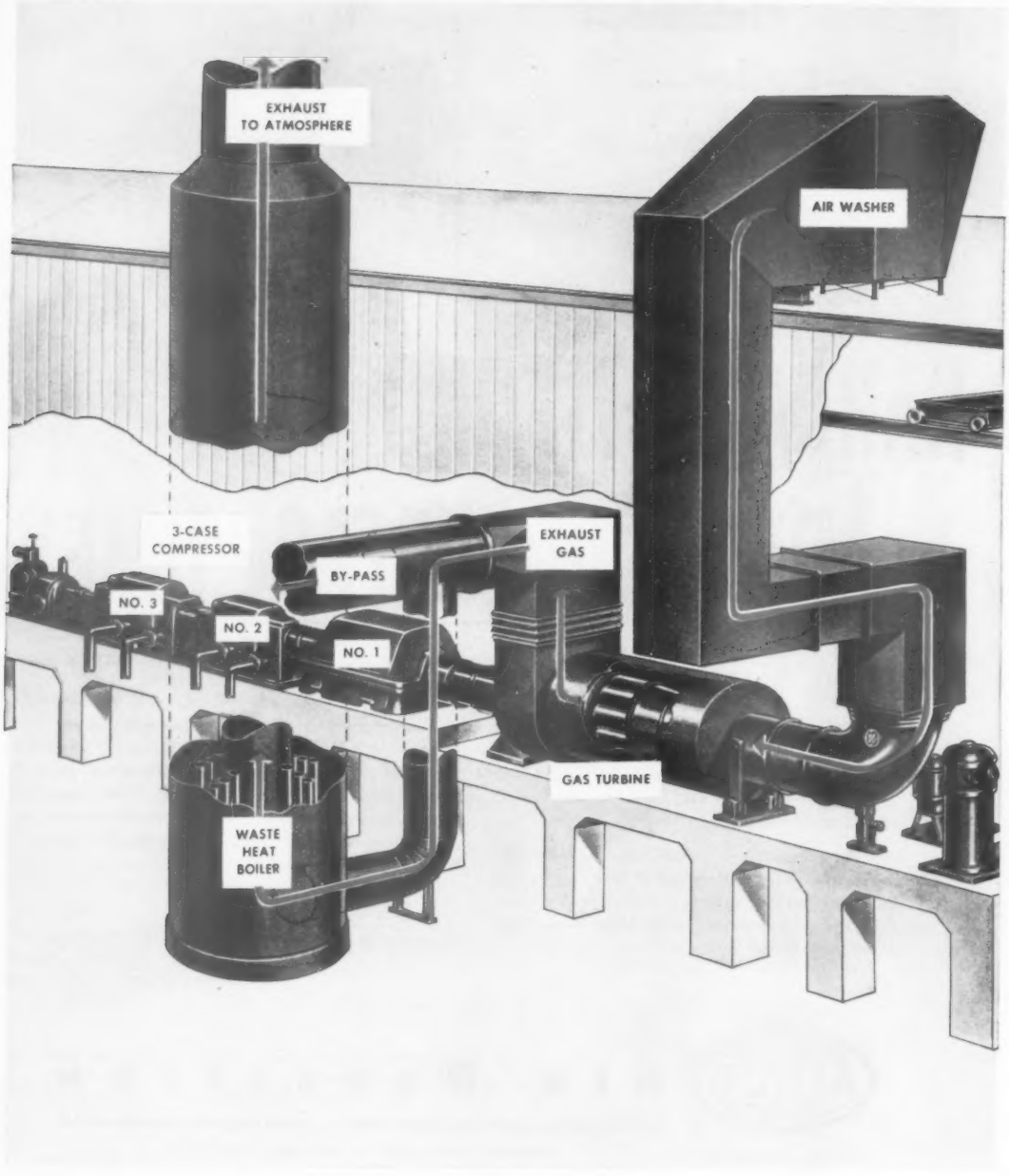
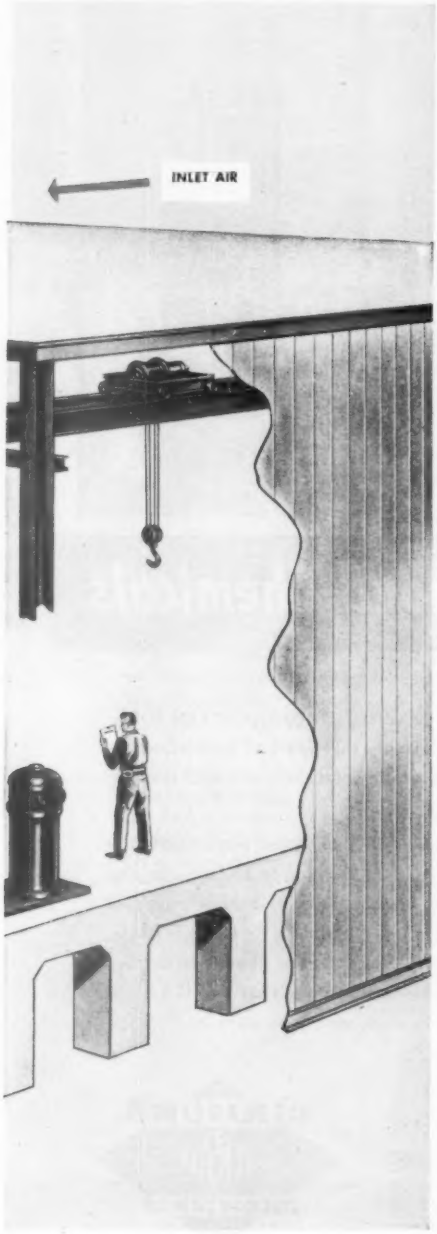
Now—G-E combustion gas



turbine for process plants



Reliable prime mover improves heat balance without need for extra steam-plant investment

Here is another application for General Electric's 5000-hp combustion gas turbine—of interest especially to refineries, petrochemical and other process plants that require considerable amounts of low-pressure steam. In many applications, it is the most economical over-all method of driving large centrifugal compressors.

Lower installed cost

If your plant requires more low-pressure steam—for an added new process or the expansion of present processing—you would ordinarily have to build additional steam-boiler facilities to maintain an efficient heat balance. Using the G-E gas turbine and a waste-heat boiler instead, you receive both needed steam and driving power, improve your plant's heat balance, and eliminate the need to invest in an extra steam plant.

Simplified building construction

For the horsepower it makes available, the building to house the G-E gas turbine is small, simple and inexpensively constructed. Foundations cost less because the turbines and the compressors they drive are relatively small and light in weight. Less manpower is required than with other types of drives, for this G-E prime mover is essentially automatic in operation—even lends itself to remote operation. With only two main rotating parts, upkeep costs are low, and maintenance is mostly a matter of periodic inspection.

Backed by G-E turbine leadership

More than 45 years of turbine-engineering leadership stand back of the G-E combustion gas turbine and assure its operating reliability. Your G-E Apparatus Sales representative will gladly discuss its application to your operation. Meanwhile, send for descriptive 16-page bulletin GEA-5530 to General Electric Co., Section 661-39, Schenectady 5, N. Y.

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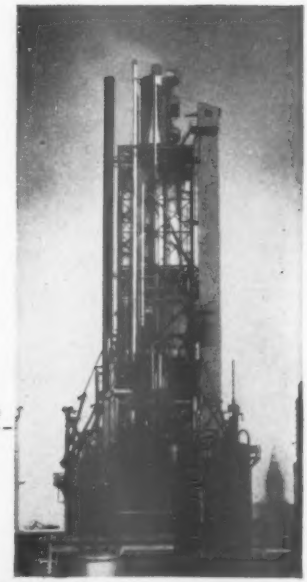

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Electric Weld Line Pipe is cold formed from flat rolled steel, both sides of which are open to inspection. This low-carbon steel is roll-formed into a perfect circle. Edges are joined by electric heat and pressure to become one pressure-resistant tubular wall. That, in brief, is Republic's *own* Electric Weld process.

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Uniformly round ends that match perfectly; uniform diameter to speed joint welding; uniform wall thickness for dependability in every inch; uniform high yield strength that permits building of higher pressure lines; uniformly straight lengths that line up evenly; high ductility steel that simplifies field bending; low carbon steel that welds readily; freedom from scale to protect against clogged valves; and long lengths to reduce the number of joints.

Up to now, more than *63,000 miles* of Republic Electric Weld Line Pipe have been placed in service during the past 23 years—in transmission, distributing, collecting and product lines. That's proof of dependability. Write for descriptive literature. Address:

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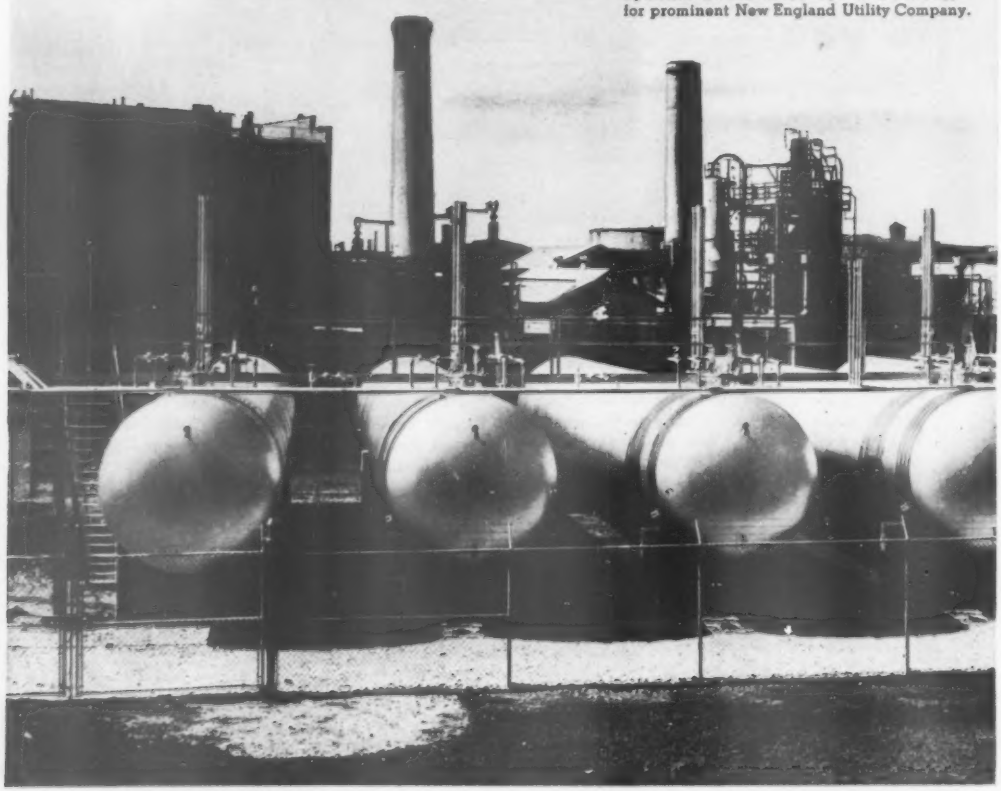

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PETROLEUM CHEMICALS DIVISION
NEWS

December ★ One of a Series of Interest to the Petroleum Industry ★ 1952

DU PONT AUTOMOTIVE ENGINEER

JAMES A. HODGES joined the Du Pont Petroleum Chemicals Division as an automotive specialist in 1950. Since then he has been attached to the West Coast district office.

He brought to Du Pont an extensive background in automotive engineering and service. Early in his career he was a supervising mechanic for the U. S. Forest Service. He then joined the Chevrolet Division of General Motors

JAMES A. HODGES

as an inspector and field engineer.

During World War II, Hodges spent two years with the U. S. Army supervising the erection and operation of automotive repair shops. He was also an instructor at the Army Officers' School on the maintenance and overhaul of Chevrolet equipment. After the war he rejoined Chevrolet as a field engineer and fleet service manager. In this capacity he conducted clinics on fleet service problems and field tested experimental units.

Super-instrumented Cadillac New "Flagship" of Du Pont Fuel Test Fleet

Sleek, futuristic *experimental* cars are constantly whetting the public appetite for more speed, power and economy. But to produce this desired performance, gasoline quality is equally as important as improved engine design. Du Pont's new, super-instrumented Cadillac is actually an experimental car—specially equipped with Du Pont-designed instrumentation to help refiners study the problems of meeting the power plant demands of tomorrow's cars.

This newest addition to the Du Pont Petroleum Chemicals Division's fuel test cars—a big Series "75" Cadillac limousine—might well be called the "Flagship" of the fleet. Carrying more than 1,600 pounds of sensitive research equipment, it is the most complete fuel test car on the road today.

In spite of its size, there is little room to spare in the car. Even the well-known Cadillac fishtails on the rear fenders have been used. One conceals an exhaust fan. The other, an automatic CO_2 fire extinguisher. And two thirds of the front seat has been cut away. The space is occupied by a multitude of electronic dials and instruments.

AIR-CONDITIONED

This unique "laboratory-on-wheels" is even completely air-conditioned. Besides adding to the comfort of passengers, the air conditioning means that the windows can be kept closed to screen out traffic noises.

DEMONSTRATES FUEL ECONOMY

The car made its first public appearance at the 1952 Automotive Industries show in Philadelphia. There it attracted wide interest from the general public as well as from automotive and petroleum people. Its intricate instrumentation proved to be a real drawing card with the public. And the crowd expressed considerable interest in one particular dial—the "miles-per-gallon-of-gasoline" indicator.

If an observer wants to know how many miles per gallon a gasoline is delivering at any given time, he merely pushes a button on the rear instrument panel and reads the figure on one of the dials. The instrument computes it automatically—by electronically dividing the car speed by the rate of fuel consumption.

OVER

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

DU PONT

PETROLEUM CHEMICALS DIVISION
NEWS

DU PONT

CONTINUED

New Cadillac

TESTS 10 FUELS EACH TRIP

The performance of ten different gasolines can be tested in a single trip. In addition to the standard gas tank, there are ten two-gallon tanks in the trunk. Each holds fuel of a different octane rating. All are connected directly to the carburetor by alternate fuel lines. Any of the 10 fuels can be fed to the engine by pushbutton from inside the car. A vent pump clears the carburetor for each fuel change.

The air-fuel ratio can also be controlled from the instrument panel. A carburetor specially modified by Du Pont makes this possible.

"BORDERLINE" FUEL RATING

An unusual feature of the Cadillac test car is a double axis recorder for plotting one value against another. On the vertical axis, the following variables may be plotted: horsepower, miles per gallon, miles per hour, torque, spark advance and throttle position. Simultaneously, time, speed in miles per hour and speed in engine RPM's can be plotted on the horizontal axis.

REAR SEAT VIEW of the Cadillac test car's console containing instrument dials, a graph recorder and control panel.

Using the measurements of these variables, a performance analysis can be made of the engine, as well as of the fuel. Almost any fuel performance factor can be studied and measured with this super-instrumented car. Here, for example, are some of the things that can be done with it:

1. Show effect of fuel quality and engine adjustments on gasoline economy and performance.
2. Pinpoint knock in terms of spark advance and speed.
3. Pinpoint knock in terms of average cylinder pressures derived from the horsepower measurements.

THE TRUNK COMPARTMENT contains 10 two-gallon fuel tanks connected by individual fuel lines; part of the horsepower and torque computer; and equipment for supplying 110 volt AC power to operate the special instrumentation. Part of the knock amplifier can be seen at the top center.

4. Evaluate acceleration characteristics relative to fuel-engine combinations.
5. Determine the amount of power developed at any given time for varying road and driving conditions.

Road-load curves can be especially valuable to refiners in helping them keep pace with the current automotive horsepower and economy races.

Since knocking tendency is sensitive to temperature variations, the car is equipped with a pyrometer to measure the temperature of air going into the carburetor; the air-fuel mixture temperature; and the coolant temperature. By graphically showing how temperature increases raise the octane requirement of an engine, this apparatus is useful in explaining octane requirement variables.

KNOCK AMPLIFIER

A special microphone is attached to the engine to pick up the slightest indication of knocking. A loud speaker makes the knocking sound clearly audible inside the car.

With this set-up, a passenger in the car can actually take part in the demonstration. Suppose, for example, a passenger wants to see exactly how spark advance affects the knocking tendency. As the driver accelerates the car, a special control knob in the back seat is used to advance the ignition spark until the engine begins to knock.

The microphone mounted on the cylinder head picks up the knock, which is amplified by the loud speaker in the back seat. At the same time, a recorder plots the spark setting against the engine speed. The resulting fuel rating curve is automatically recorded on graph paper.

THIS VIEW of the engine shows part of the "Freon" compressor for the air conditioning system on the right and a special 160 amp generator on the left. The horizontal tubes in front of the radiator are the "Freon" cooling coils. An electronic fuel meter is mounted on the engine compartment fire wall just ahead of the steering wheel.

MOVIES AVAILABLE

The following Du Pont films may be borrowed or purchased by oil companies. Address your request to the nearest Petroleum Chemicals Division district office.

Pipeline on Wheels—A 26-minute, full-color movie on tank truck safety. Suitable for both training and public relations purposes.

What Makes a Gasoline Good—An 18-minute cartoon movie in color. Presents, in easy-to-understand form, the story of how high quality gasoline is made. Ideal for dealer training meetings.

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most dependable tools for time-saving accuracy

MAKE HALLIBURTON BEST FOR YOUR DRILL STEM TEST!

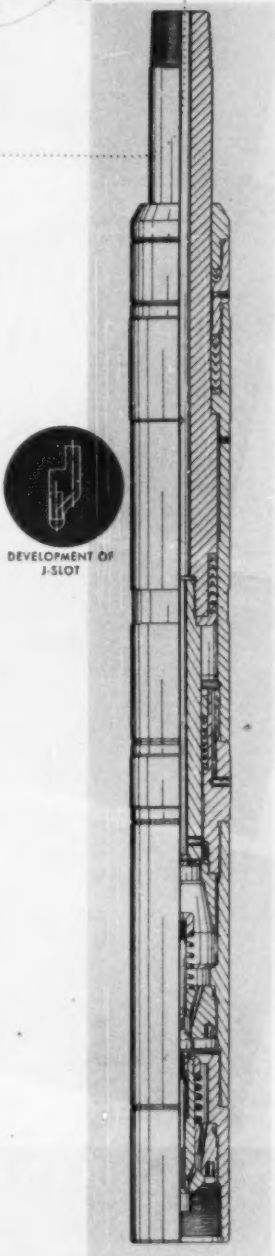
Takes an old-timer to remember a misrun by Halliburton. For the advanced highly specialized tools on Halliburton's string give you an accurate, time-saving test that's usually right on the very first run. Such reliability results from Halliburton's million-job experience, 27 years research, and a strong desire to perform the best service in the business. These are the reasons why you get many important features that are exclusive on Halliburton's testing string.

You get Halliburton's BJ tester that's famous for dependable service under the most difficult conditions. Its rugged and simple mechanics include the new curved J-Slot that automatically locks the tool and prevents valves from opening too soon. The tool cannot be opened until set and drill pipe rotated and lowered. Then it's closed and locked simply by raising drill pipe a few feet.

For operators who prefer the bar drop tool, Halliburton offers the new SS Type Tester.

Other exclusive features on Halliburton's string include 1) the multi-purpose circulating valves—a safety device that also is used to circulate and condition drilling fluid when necessary, 2) special duty packers designed to meet various hole conditions, 3) surface-controlled adjustable chokes, 4) locked-open By-Pass, 5) Bourdon Tube Pressure Recording Device, and many more desirable advantages available only from Halliburton.

Consider this great combination of specialized tools that make misruns a rarity with Halliburton. Phone your Halliburton Testing Specialist for your next test—he's only minutes away from you. Halliburton Oil Well Cementing Company, Duncan, Oklahoma.



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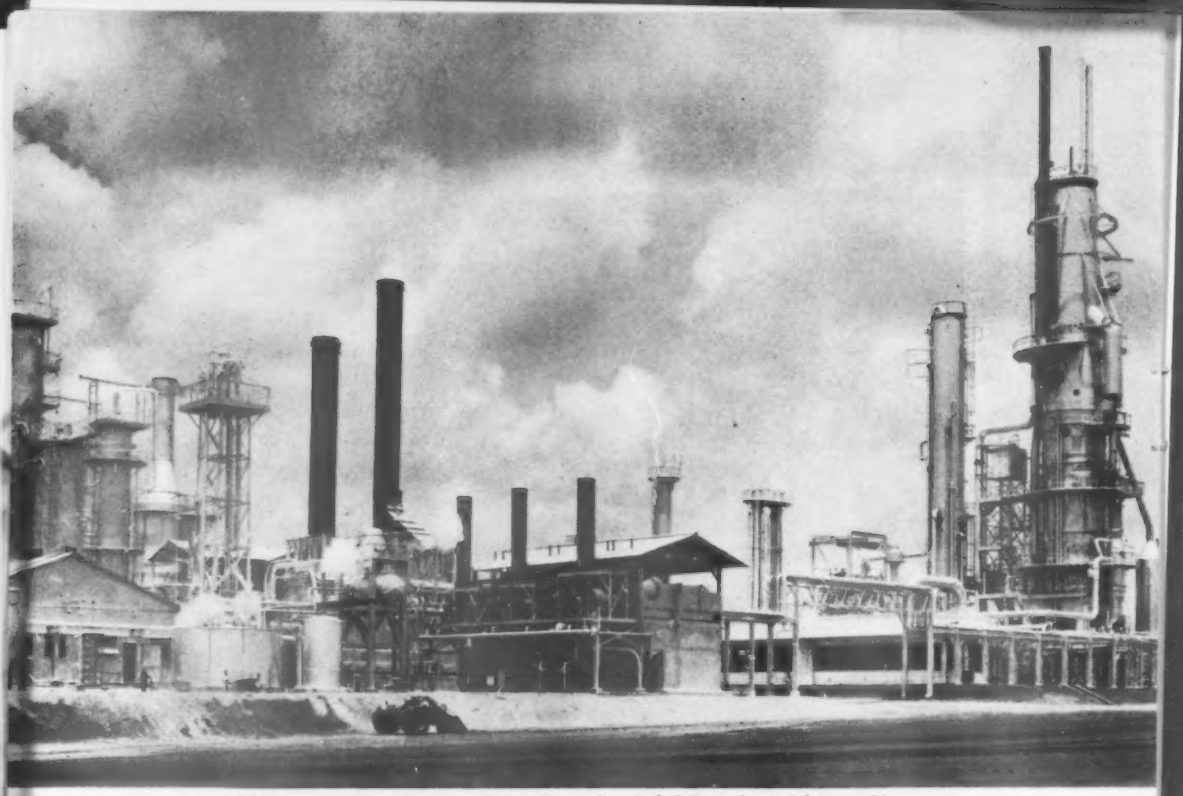
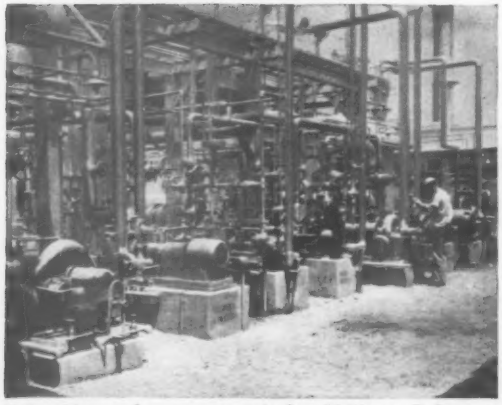
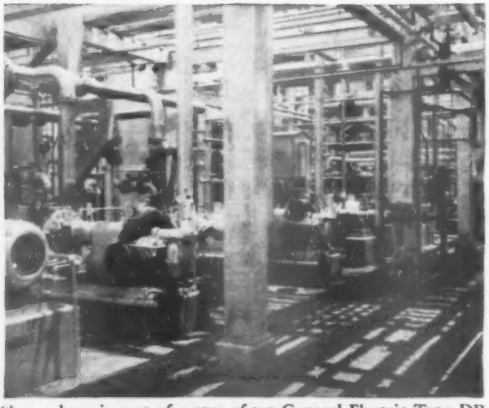


McMurrey Refining Company, Tyler, Texas, installed G-E mechanical-drive turbines throughout their plant to help assure continuous capacity output of 5000 bbls. per day.

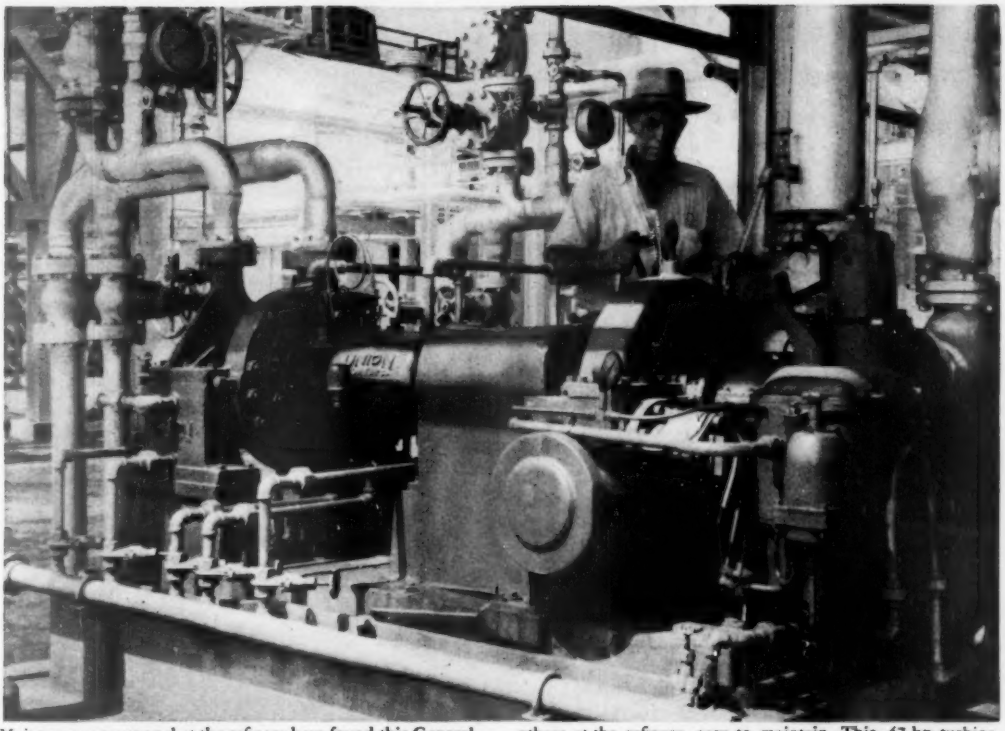
G-E Turbines Save Maintenance,



G-E turbines and motors are paired at McMurrey Refinery to utilize large steam supply efficiently. When process steam demands decrease, surplus steam is economically diverted to turbine drives. These Type DP turbines range from 8 hp to 41 hp.



Shown here is part of a row of ten General Electric Type DP turbine drives and motors, ranging from 9 hp to 48 hp. The many interchangeable parts on these turbines make stocking of spare parts an economical matter.



Maintenance personnel at the refinery have found this General Electric Type DP mechanical-drive turbine, like the many others at the refinery, easy to maintain. This 47-hp turbine at McMurrey Refinery drives a boiler-feed water pump.

Inventory Costs at McMurrey Refinery

Installed to improve steam balance, G-E standard turbines, with many interchangeable parts, also cut inventory costs.

The McMurrey Refinery, Tyler, Texas installed General Electric mechanical-drive turbines to help regulate steam balance. Since process steam demands range from 30% to 70% of available supply, surplus steam is economically diverted to turbine drives.

Time soon proved the many other advantages of G-E turbine drives which were especially designed for the petroleum industry. Mr. Dave Hood, Mechanical Maintenance Foreman at the refinery, states, "With these turbines on the line now for over a year, we're happy to report that they are extremely easy and economical to maintain, requiring very little of our time for maintenance."

Mr. Hood also said, "Since we have quite a few different sizes and ratings of turbines here, we're particularly pleased with the great number of interchangeable parts on these turbines. It certainly cuts down our inventory problem." Interchangeability of a great majority of the replaceable parts (regardless of hp rating) is a big feature with G-E standard turbine drives, which are paired with motors throughout the refinery to help assure uninterrupted service.

Call in your G-E sales-engineer or write for bulletin GEA-4955A, "A New Standard in Mechanical-drive Turbines." Section 252-58, General Electric Company, Schenectady 5, N. Y.

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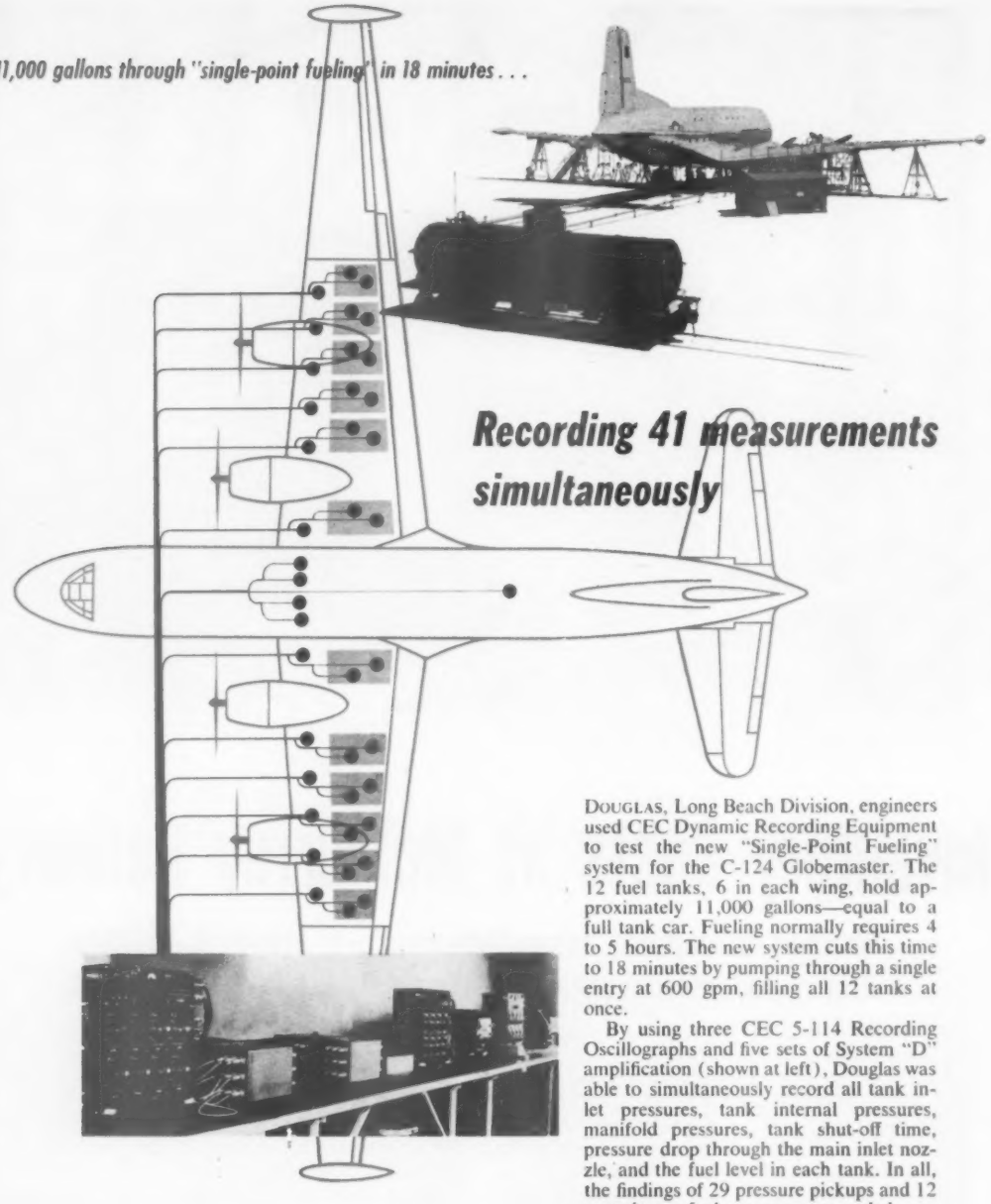
11,000 gallons through "single-point fueling" in 18 minutes . . .



Recording 41 measurements simultaneously

DOUGLAS, Long Beach Division, engineers used CEC Dynamic Recording Equipment to test the new "Single-Point Fueling" system for the C-124 Globemaster. The 12 fuel tanks, 6 in each wing, hold approximately 11,000 gallons—equal to a full tank car. Fueling normally requires 4 to 5 hours. The new system cuts this time to 18 minutes by pumping through a single entry at 600 gpm, filling all 12 tanks at once.

By using three CEC 5-114 Recording Oscillographs and five sets of System "D" amplification (shown at left), Douglas was able to simultaneously record all tank inlet pressures, tank internal pressures, manifold pressures, tank shut-off time, pressure drop through the main inlet nozzle, and the fuel level in each tank. In all, the findings of 29 pressure pickups and 12 capacitance fuel gages were recorded.

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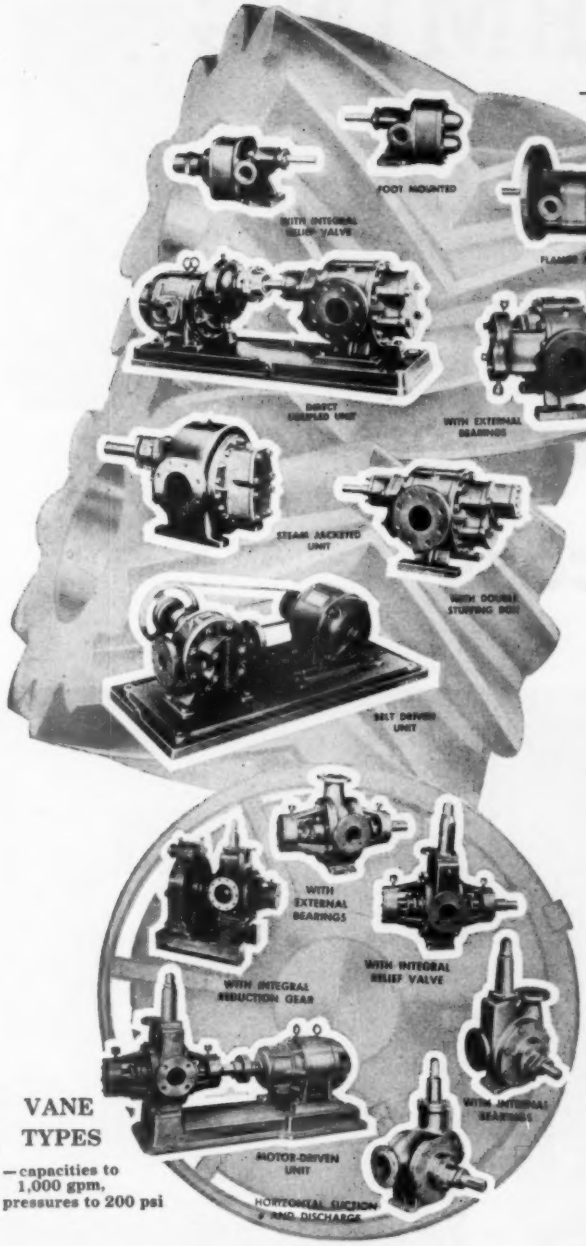
Dynamic Recording Systems

such as the one shown here are designed and manufactured by Consolidated. Variations in the arrangement of the equipment are infinite. Applications are widely varied throughout industry and the sciences. A typical recording system includes pickups, amplifiers or bridge balances, and a recording oscillograph. Write for Bulletin CEC 1500B.



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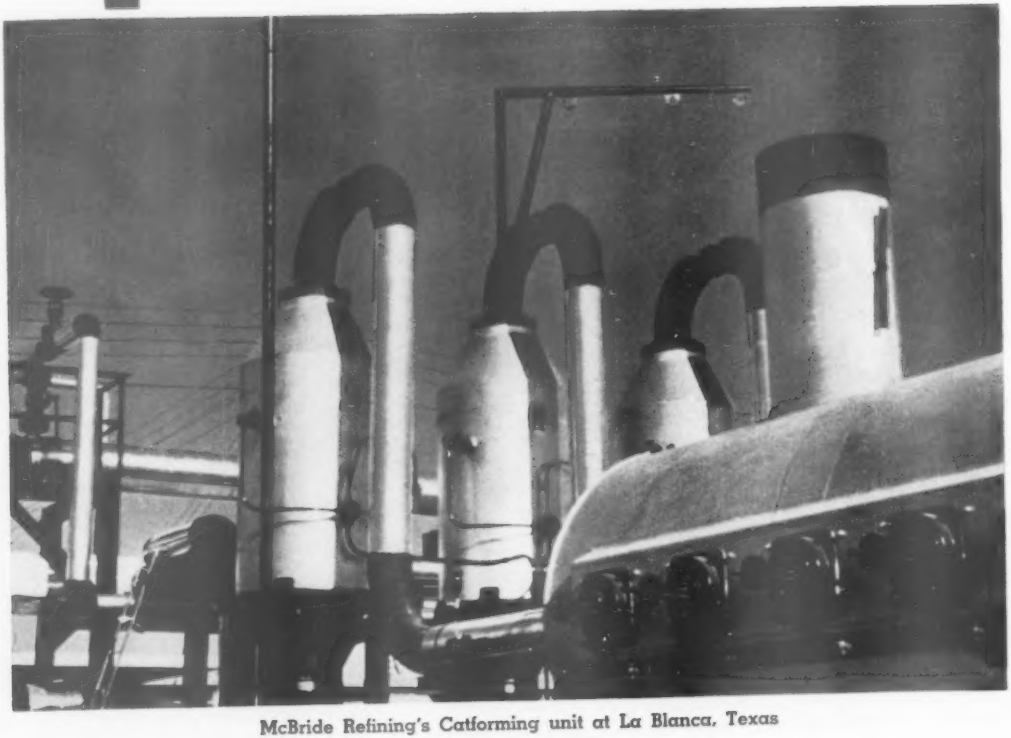
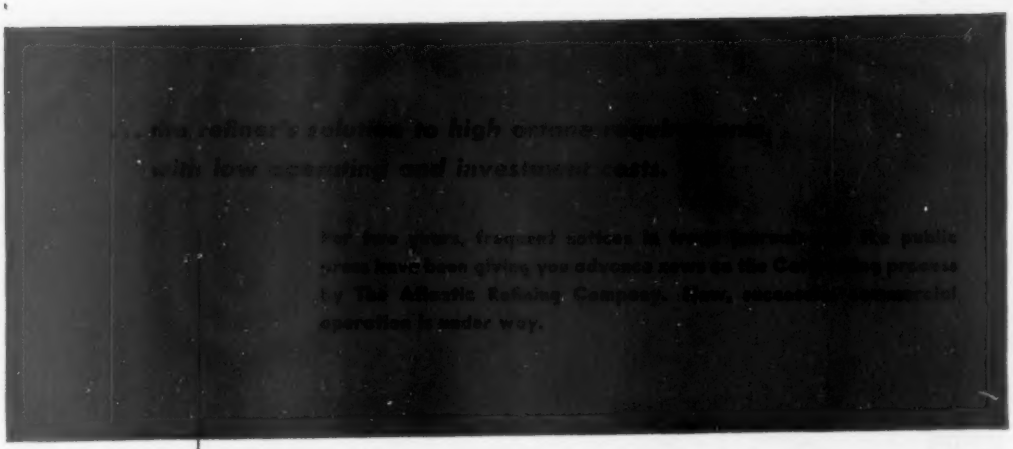


McBride Refining's Catforming unit at La Blanca, Texas



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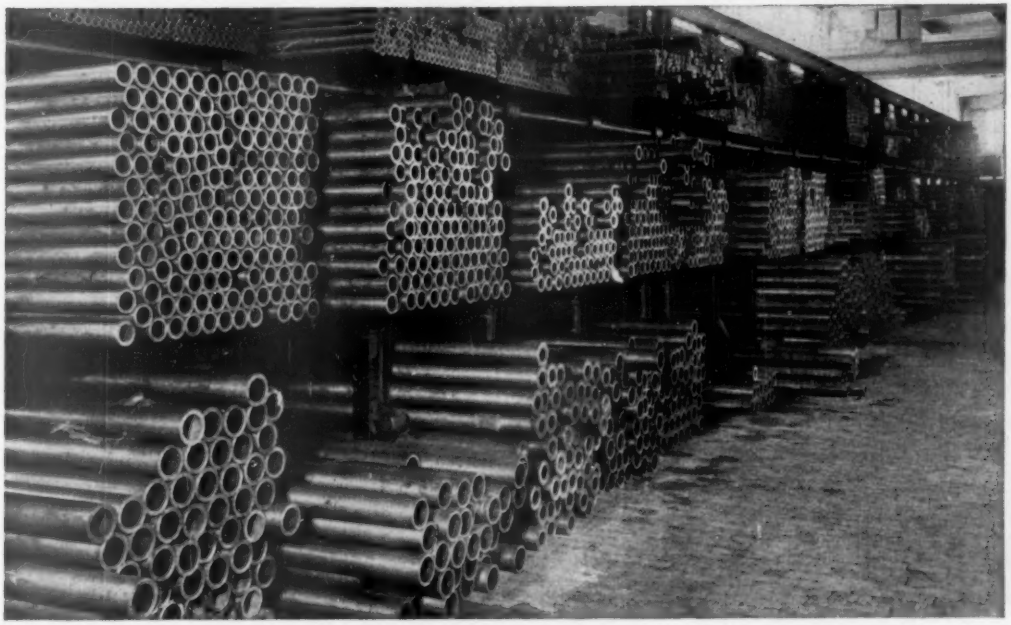


. . . we ship it from here tomorrow!

IF you're in a hurry for wear-resistant 52100 tubing, phone, wire or write the Timken Company. Shipment will be made from mill stock within 24 hours after receipt of your order!

52100 steel tubing manufactured by the Timken Company can be heat treated to file hardness and tempered back to any desired point. A high carbon chrome steel, it is through-hardening in moderate sections and can often be used in place of more expensive steels. It's available in a wide range of sizes from 1″ to 10½″ O.D.

Timken® 52100 tubing will do many of your hollow parts jobs: aircraft parts, ball bearings, pump parts and plungers, collets, bushings, spindles, grinding machine parts and precision instrument parts, to name a few.

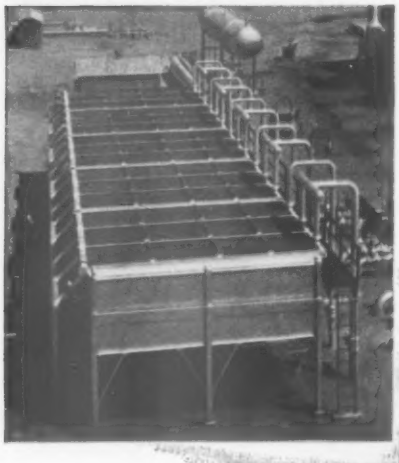
As America's earliest and foremost producer of 52100 tubing, the Timken Company has unequalled experience that results in uniform high quality from tube to tube and order to order. Rigid quality control checks every step of production.

For immediate delivery of your less-than-mill-quantity orders, write, wire or call The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

Announcing the NEW improved . .



The new improved FLUOR FIN-FAN HEAT EXCHANGER now comes equipped with *Transaire Sections,* offering heat transfer surface with many distinct advantages. Now for the first time the Fluor Fin-Fan is completely selected and supplied by Fluor. Write for Bulletin FF-8501R.

The design features of Transaire Sections appreciably hold velocity pressure loss to a minimum, provide smoother flow into and from tubes with a reduction in turbulence, increase cooling capacity at lower horsepower, increase the safety factor, and offer desirable features unobtainable in other air-cooled heat exchangers of conventional design.

The Fluor "truss-type" steel structure remains essentially the same. The plenum design, the trouble-free performance of Fluor mechanical equipment, the uniform prefabrication of parts, the adaptability to almost any new duty involving pressures to 5,000 p.s.i. and temperatures to 1,500°F—these have been retained.

BE SURE WITH **FLUOR**

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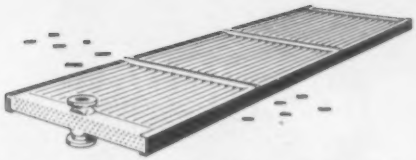
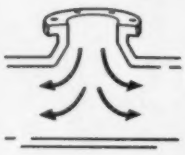
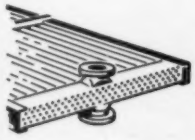


Transaire Sections offer these advantages:



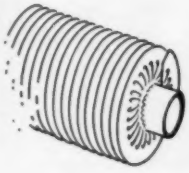
1. Less pressure drop

Inlet and outlet nozzles in the header-manifold allow for a full pipe cross sectional area opening into the header with curved entrance to keep velocity pressure loss at a minimum. Note how the nozzle widens out below the inlet flange permitting a smoother, more natural flow into the header. Tube holes are taper countersunk for the same reason.



2. Four-to-one safety factor

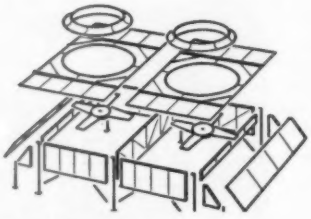
Headers are either cast iron or fabricated steel and in either case are *unconditionally guaranteed* to withstand test pressures of four times the design pressure. Brass header plugs provide quick easy access to tube ends for cleaning or replacement without requiring special tools.



3. More heat transfer surface

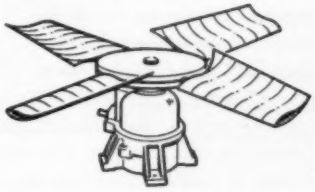
Fins are crimped, and crimped fins present more surface area to tubes which in turn means more metal-to-metal contact and greater dissipation of heat. The crimp also presents more fin surface to passing air. Tubes are available either in admiralty, steel or other materials as required. Fins of copper or aluminum.

Fluor Structures provide these advantages:



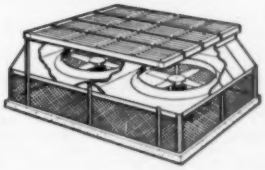
1. Rigidity of steel

The entire steel structure is conservatively designed with "truss-type" construction. All parts are prefabricated to size to fit all units which greatly facilitates field erection work. Fluor's wide experience as designers and constructors of plants and equipment for industry insures proper application and successful operation of every Fin-Fan installation.



2. Mechanical excellence

Mechanical equipment for Fluor Fin-Fans is built to withstand the most rigorous heat transfer requirements. 4 basic gear units cover 4 different and distinct horsepower ranges. This, coupled with a choice of fan assemblies ranging up to 20′ diameter with 2, 3, 4 or 6 blades per fan unit, enables the proper combination of gears and fans for maximum efficiency.



3. Meet space requirements

Fluor Fin-Fans are adaptable to available space. They may be connected in series for long temperature ranges, or in parallel for large capacities. Single units can be used for multiple duties in widely diversified applications economically and at low maintenance costs. Parts are simple and standardized to save erection time in the field.

Gehring Service Crew and trucks
in front of their shop in Casper, Wyoming

Photo A

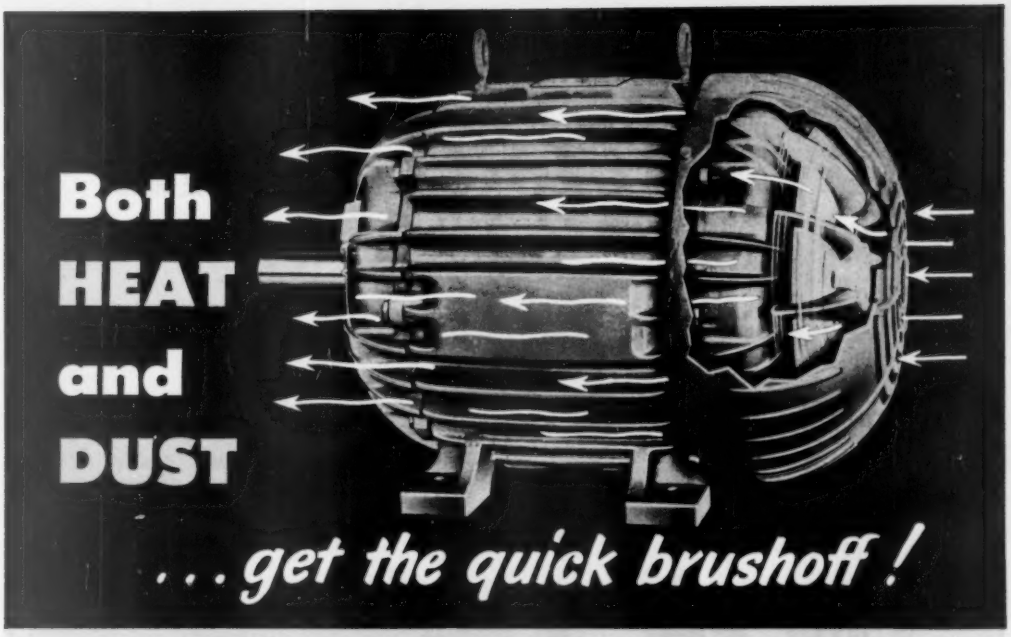
Photo B

Photo C

Gehring Equipment Company, another member of the Wilson family of factory trained and completely equipped field shops, has been servicing Wilson Rigs and Winches since 1948. Gehring's service for Wilson Rigs is rendered on a 24-hour basis to all parts of the Rocky Mountain area. In this vast, far-flung area, speed is essential so Gehring utilizes their plane (Photo A at right) plus their mechanic-to-rig service (Photo B) to give prompt service when and wherever is needed. The Gehring Parts Department (Photo C) is completely stocked to prevent any hold-up on service. With Service Shops such as Gehring in the field you can readily see why a *Wilson Rig is your best buy.*

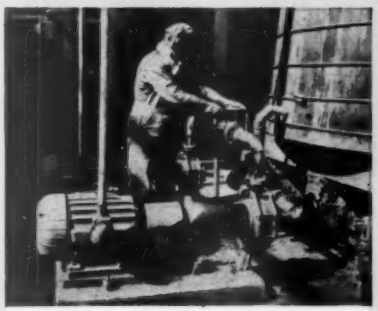
Wilson MANUFACTURING CO., INC.

WICHITA FALLS, TEXAS



ELLIOTT CROCKER-WHEELER

Sealedpower MOTOR



WHERE EVEN THE AIR HAS TEETH

containing fumes so corrosive that in this chemical plant the operator turning the valve must wear rubber gloves and a face-mask. The two *Sealedpower* motors wear just their totally enclosing jacket, and keep cool and clean with no trouble. This sort of thing is all in the day's work for *Sealedpower* motors.

"Keep moving" says the cowl-directed air blast to heat, dust and dirt, as it sweeps along the radiating fins of the motor's outer case. This totally-enclosed fan-cooled *Sealedpower* motor, with its eleven-year service record, has worked in so many tough spots that its ability to take the worst you can hand it is proven beyond question. Its name, *Sealedpower*, means what it says—power that's sealed in, immune to outside conditions, with the plus factor of radiating fins and the air blast to take away heat and prevent dust from settling. *Capacities 3 to 125 hp. Also explosion-proof, underwriters approved, in most ratings. Bulletin on request.*

ELLIOTT Company

CROCKER-WHEELER DIVISION
AMPERE, N. J.

W3-33

For large motors: RIDGWAY DIV., RIDGWAY, PA.
Plants at: JEANNETTE, PA. • RIDGWAY, PA. AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.
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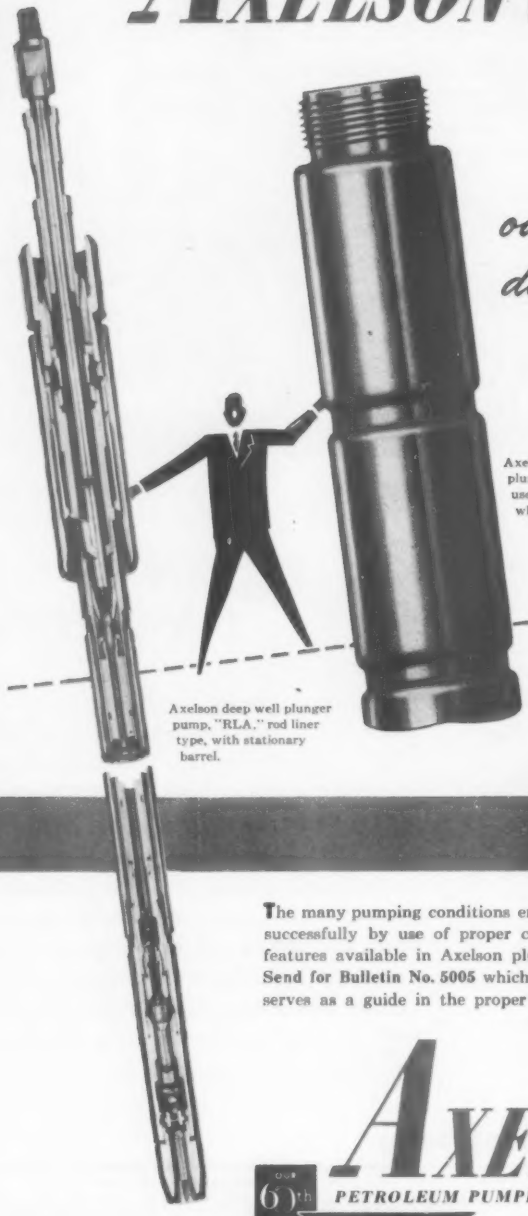
AXELSON PLUNGERS



outstanding in design and quality

Axelson patented pin end, grooved plunger, chrome plated. Most frequently used under abrasive conditions where a loose fit is desirable.

Axelson deep well plunger pump, "RLA," rod liner type, with stationary barrel.

The many pumping conditions encountered in the production of oil can be met successfully by use of proper combinations of operating surfaces and design features available in Axelson plungers.

Send for Bulletin No. 5005 which details data relative to Axelson plungers and serves as a guide in the proper selection of appropriate plungers.

AXELSON *Chosen first....to last!*

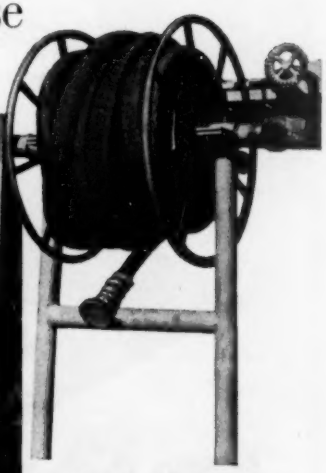
PETROLEUM PUMPING EQUIPMENT

OUR 65th YEAR

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON MANUFACTURING COMPANY, Division of Pressed Steel Car Company, Inc. • PLANTS—Los Angeles 58, California; St. Louis 16, Missouri. OFFICES—New York City 7, New York; Tulsa 1, Oklahoma; Buenos Aires, Argentina. DISTRIBUTORS—Jones & Laughlin Supply Co.; Great Northern Tool & Supply Co.; Industrial Agencies, Ltd., San Fernando, Trinidad, B.W.I.; Industrias Waldrip & Campbell, Barcelona, Caracas and Maracaibo, Venezuela; South American Supply Co., Ltd., Lima, Peru; Sociedad Comercial de Materias Primas Limitado, Rio de Janeiro, Brazil; G. Saavedra e Hijos, S. de R. L., Avenida Morelos 31, Mexico, D.F.; Dominion Oil Field Supply Co., Ltd., Calgary, Canada.

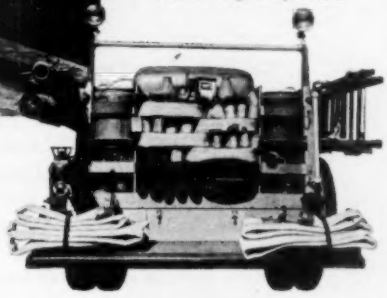
Maintenance men and firefighters rely on U. S. Rubber Hose



Above is a "U. S." neoprene-covered fire hose in a refinery. It is resistant to sun, chemicals, oil, abrasion and mildew. It has the popular fog nozzle.

(left) **"U. S." hose** used for fire fighting as well as general wash-down purposes.

(below) **U. S. Matchless Carbolized fire hose** can handle 500 gallons per minute. Note how its flexibility allows it to be folded into the truck's storage compartment.



Many a leading modern refinery depends on "U. S." hose of several types to help protect against fire. Each hose is specially designed and built to handle a definite set of working conditions. Highest grade materials, scientifically compounded rubber, uniformity of construction, skilled workmanship — these are the secret of "U.S." hose superiority. For extra special circumstances, "U.S." engineers will develop hose to meet your requirements. Write to address below.

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Spicer

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The designing and manufacturing skill gained from producing millions and millions of Spicer units is used by a majority of manufacturers in the truck, bus, tractor and passenger car fields. These Spicer products are built in modern plants that employ the industry's most advanced production-equipment and techniques. Spicer . . . and Spicer alone . . . offers you a complete range of products covering every need in the automotive power transmission field. Look to Spicer for assistance that perseveres all the way from the drawing board through to service in the field.

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SPICER "BROWN-LIPE" GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS
RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES

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CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

NETWORK STATION, the Mid-Continent location at Sundown, Texas and its 180-foot tower. With three exceptions, all towers in the 8-station network are 180 feet high.

MID-CONTINENT GIVES FASTER SERVICE... SAVES MONEY WITH G-E 2-WAY RADIO

All oil field customers benefited when this company linked offices and field cars in West Texas and New Mexico with fast, dependable, G-E narrow band two-way radio units.

Drilling crews and rig operators in 23 counties from Snyder west to Eunice now get fast equipment repair and service. Mid-Continent has stations located at Midland, Odessa, Snyder, Kermit, Brownfield, Sundown, Hobbs, and Eunice, with construction under way at Abilene, Wichita Falls, Gainesville and Bowie.

Here's how it works. A field man out of Mid-Continent's Snyder location, for example, recently drove up to a rig 35 miles out of town just as the rotary hose blew out. Picking up the microphone in his car, the field man called the office and ordered new hose, which was on its way to the rig in minutes. Saved: 2 hours of shutdown.

"It boils down to one thing," sums up Division Manager W. W. Arnold, "G-E 2-way radio helps us service our customers faster than any other tool we've got. It saves us both time and money."

The Mid-Continent system consists of G-E narrow band mobile and station units, acclaimed by oil men as the most dependable on the market. G-E engineers surveyed this user's needs, designed the system to fit, and installed the equipment. It is kept in shape with year 'round inspections and servicing.

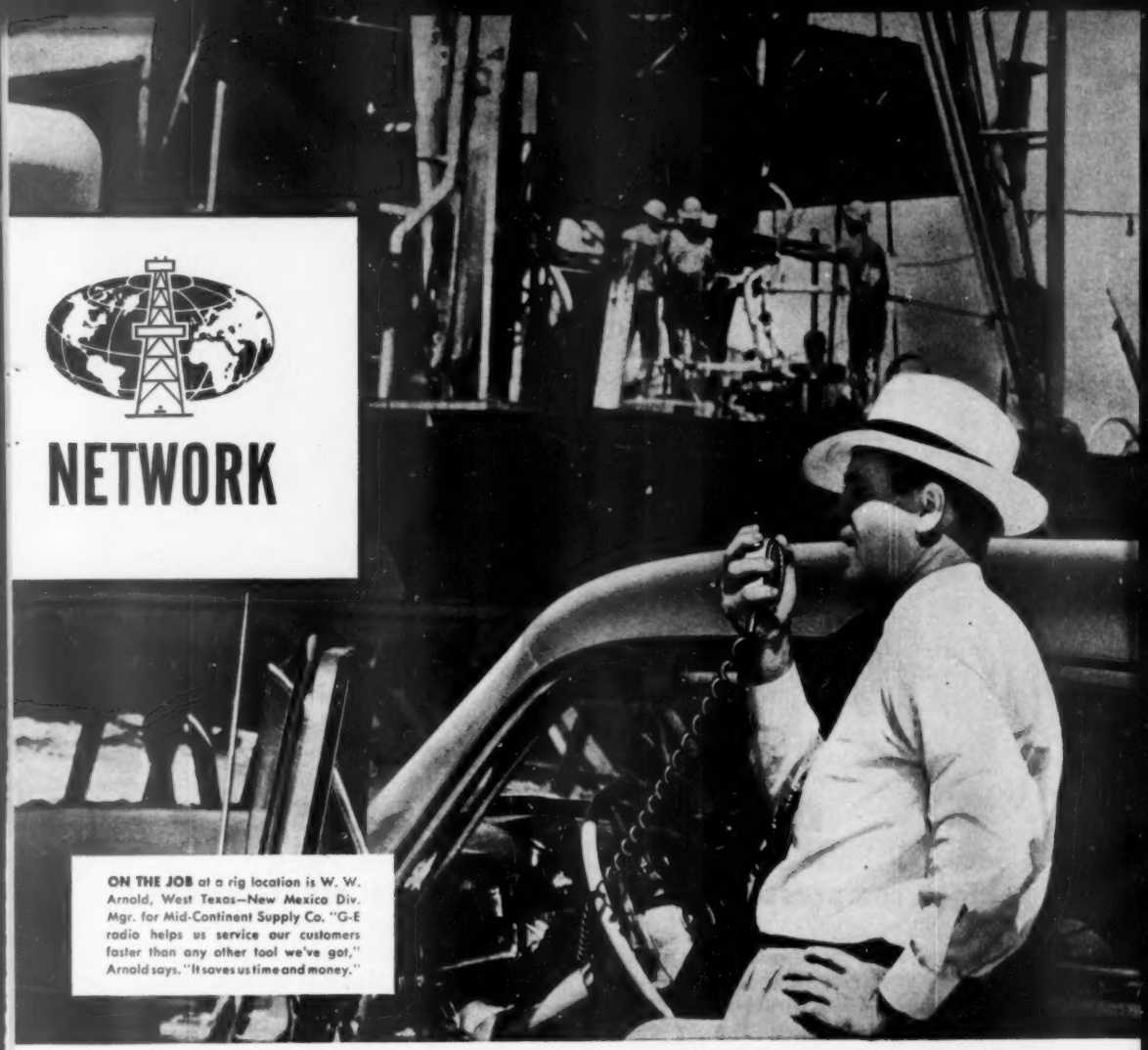
There's a CAS* man in the General Electric office near you who can help solve your communications problem. Call him today!

**Communications Advisory Service*

WAREHOUSE INSTALLATION. A Mid-Continent man answers a call from the field at the General Electric cabinet installation in the company's Snyder warehouse.

FIELD SUPERVISION. A call is made by a Mid-Continent Supply Co. field man to his home office. Field calls like these save valuable time—get the job done faster.

TRANSMISSION EQUIPMENT. Widely separated stations in the Mid-Continent network relay messages to cars through a central control center.


NETWORK
ON THE JOB at a rig location is W. W. Arnold, West Texas–New Mexico Div. Mgr. for Mid-Continent Supply Co. "G-E radio helps us service our customers faster than any other tool we've got," Arnold says. "It saves us time and money."

CALL ANY OF THESE GENERAL ELECTRIC OFFICES:

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New Orleans, La.	Washington, D. C.	Columbus, Ohio	St. Louis, Mo.
Los Angeles, Calif.	Boston, Mass.	Pittsburgh, Pa.	San Francisco, Calif.
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You can put your confidence in—

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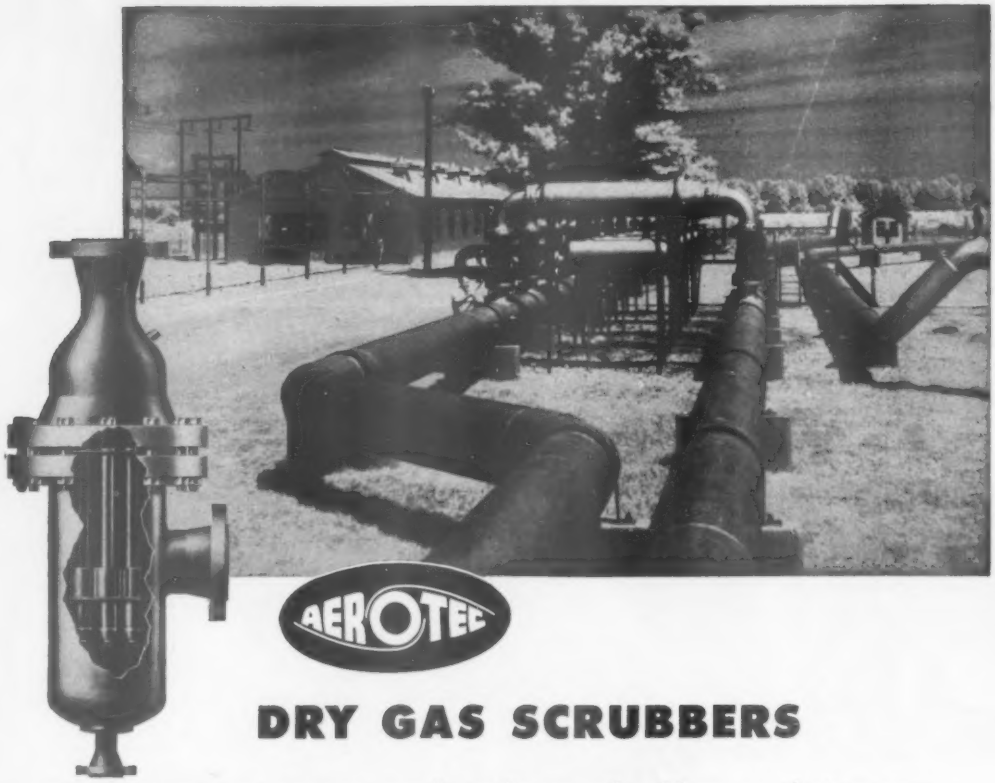


AEROTEC

DRY GAS SCRUBBERS

protect compressors and reduce pipeline maintenance

Dusts and distillates in natural gas put an unnecessary drag on profitable pipeline operation. Aerotec Dry Gas Scrubbers get rid of these damaging impurities with high efficiency, thereby reducing maintenance to a minimum. This is a proven fact in well and pipeline installations across the country.

The Aerotec Scrubber, unlike conventional types, uses no liquid filtering medium. Hence, you eliminate carryover of elements that cause compressor wear. You also avoid other difficulties normally encountered with wet-bath scrubbing methods. The Aerotec units assure clean, *dry* gas that flows freely and saves on repair and maintenance costs.

Basis of this efficiency is a unique method of scrubbing gas by the use of multiple, small-diameter tubes. Through the principle of dry separation by centrifugal force, foreign solids and liquids are precipitated, leaving the gas clean and dry.

Simplified piping permits easy installation of the compact, lightweight Aerotec Dry Gas Scrubber. Standard units up to 100,000,000 SCFD are available, with larger capacity requirements met by manifolding. For technical data and engineering assistance in selecting the Aerotec Scrubber best suited to your gas-cleaning needs, call or write our representatives today.

Project Engineers **THE THERMIX CORPORATION** Greenwich, Conn.

(Offices in 38 Principal Cities)

***Canadian Affiliates:* T. C. CHOWN, Ltd., Montreal 25, Quebec; Toronto 5, Ontario**

Manufacturers

THE AEROTEC CORPORATION

GREENWICH, CONN.

What's Your Yardstick for Measuring Drilling Line Quality?

Most oil country men use one basic yardstick to measure drilling line quality and that's the service record. But at J&L we use hundreds of instruments, gauges and tests to check on the quality of J&L Wire Rope through every step in its production from the iron ore in J&L mines through the final closing and stranding of the rope. That's the only way we can be sure J&L drilling lines will pass the *important* test of quality in the field.

It's the down-to-earth test of performance on the job. The results are on the wire rope service record in terms of hole per wire rope dollar, downtime for re-rigging and length of service life. And because J&L drilling lines have posted a top-flight record, more and more cost-conscious drillers are finding themselves sold on J&L.

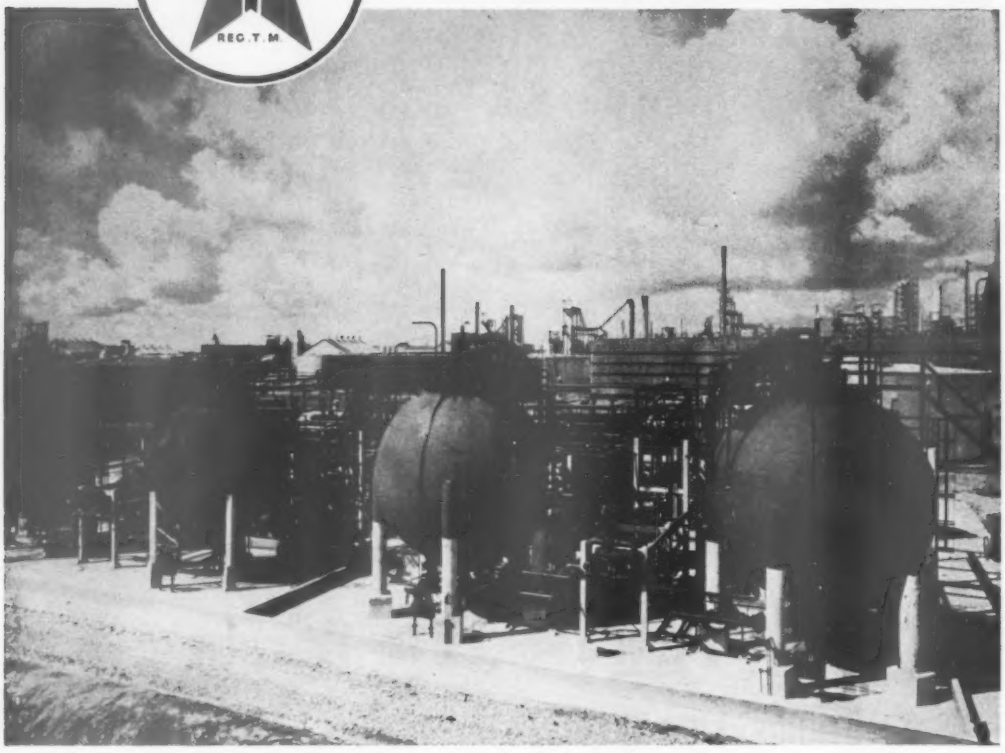
Why don't you put J&L drilling lines to the performance test on your cable tool or rotary rigs? You'll find all J&L Wire Ropes are "precisionbilt" to provide you with the easy handling and maximum service life that will help keep operating costs at a minimum.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PA.

J&L STEEL

TEXACO
REG. T. M.

another leading refiner who desalts with PETRECO



Illustrated above is one of the largest batteries of Petreco Electrospheres in the world. This installation is located at the Port Arthur, Texas, refinery of The Texas Company. In refinery after refinery, Petreco Desalters have proved their pay-out by increasing on stream time, increasing expected unit throughputs and by reducing maintenance and repair costs. These advantages derived from charging desalted crudes also entail benefits such as reduced furnace plugging, longer tube life, maximum exchanger efficiency, less corrosion in the topping section, clear water bleed, salvaged waste oil and trouble-free, automatic desalter operation. For the best in desalting performance and service, get Petreco.

PETROLITE CORPORATION
PETRECO DIVISION

1390 E. Burnett St., Long Beach 6, Calif.
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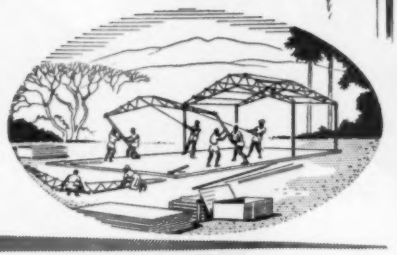
PETRECO

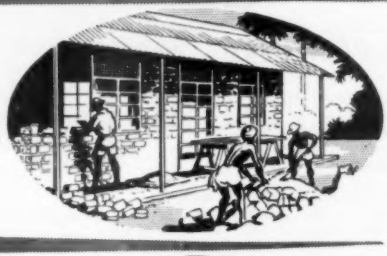
ELECTRIC PROCESSES FOR THE PURIFICATION OF PETROLEUM

CRUDE OIL: **REMOVAL OF SALTS, SOLIDS AND OTHER IMPURITIES; DEHYDRATING**
DISTILLATES: **ACID, CAUSTIC AND DOCTOR TREATING**
FUEL STOCKS: **DESAPONIFICATION**

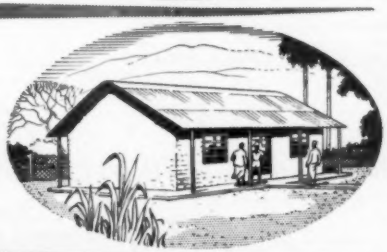
(1) *Here you see an upright of the 'Arcon' framework being raised into position. It takes little more than seven hours for seven unskilled men to assemble a 3-bay unit.*



(2) *Once the roofing is fixed, the walls can be constructed from inexpensive local materials — in this case unfired brick.*



(3) *This is part of the housing programme recently planned for a major oil Company in Persia. The 'Arcon' building is cool, spacious and hygienic, ideally suitable for the purpose.*



When a major oil Company decided to go ahead with a large-scale housing programme in Persia, it chose 'Arcon' because it exactly fulfilled their requirements. The labour at their disposal was able to assemble the framework, roof it, and complete the walls in a matter of hours and the finished accommodation was ideal for the housing of Company personnel and families in such a climate. The buildings are strong, fireproof, termite-proof and almost indestructible, and they can easily be extended when necessary simply by adding extra 'Arcon' bays. The special heat-insulated interior roofing keeps the dwellings cool even during the hot season, and this factor, together with 'Arcon's' spaciousness and cleanliness, ensures the best conditions for employees and their families.

We have also supplied the 'Arcon' Structure for tanning-bark storage in Kenya, saw-mills and joinery works in Tanganyika, and for an open-air theatre-cum-cinema in Australia; all of which illustrates the amazing potential of 'Arcon's' applications, and its value in all parts of the world for an infinite variety of purposes. The 'Arcon' Structure can be used for housing, schools, storehouses and many other building purposes. Its great adaptability and ease and speed of erection make 'Arcon' the natural solution to most accommodation problems; whilst its very nature means that it is surprisingly inexpensive.

We will gladly send you our free brochure giving you full details of the 'Arcon' Tropical Structure. You will be able to see clearly how 'Arcon' can supply the answer to *your* needs.

'ARCON' Structures

Write to

TAYLOR WOODROW (BUILDING EXPORTS) LTD.

41 WELBECK STREET · LONDON W.1 · ENGLAND

Oil helps make him master of space...

He's a "Buck Rogers" compared to the World War II pilot. He maneuvers at altitudes and speeds which pilots of propeller-driven craft are unable to match. He can do this because jet engine manufacturers, the military services, and the oil industry worked together to develop jet aircraft operation. Here and around the world, jet aircraft is being powered and lubricated with products produced by The Texas Company.

The Texas Company

TEXACO

Faithfully yours 1902 | *for Fifty Years* 1952

FACT

ABOUT TUBE FABRICATION

In addition to saving up to 80 per cent in material costs, Alcoa Aluminum Heat Exchanger Tubes make further savings in fabrication. Their ductility makes them easy to roll in and bead. Completed bundles weigh considerably less than bundles made of heavy metal tubes. This lighter weight is favorably reflected in lower shipping and handling costs.

ALCOA

knows most about their use and application

Alcoa pioneered the use of aluminum in heat exchanger tubes 43 years ago. For complete information on their application and installation, write for a copy of the booklet, *Alcoa Aluminum Heat Exchanger Tubes.* Write:

ALUMINUM COMPANY OF AMERICA
1864-M Gulf Building • Pittsburgh 19, Pa.

OVER 6-MILLION FEET OF ALCOA TUBES ARE IN USE FOR APPLICATIONS LIKE THESE . . .

PETROLEUM

- Condensers handling hydrocarbon fractions from such processes as Thermal and Catalytic cracking, reforming, polymerizing, etc.
- Vapor recovery condensers
- Lube oil coolers
- Natural gas compressor after-coolers
- Recompressor after-coolers
- Hydrogen sulfide gas coolers
- Furfural condensers and heat exchangers
- Propane chilling
- Wax sweaters
- Lean oil—rich oil exchangers
- Amine solution coolers
- Glycol-amine heat exchangers and reboilers

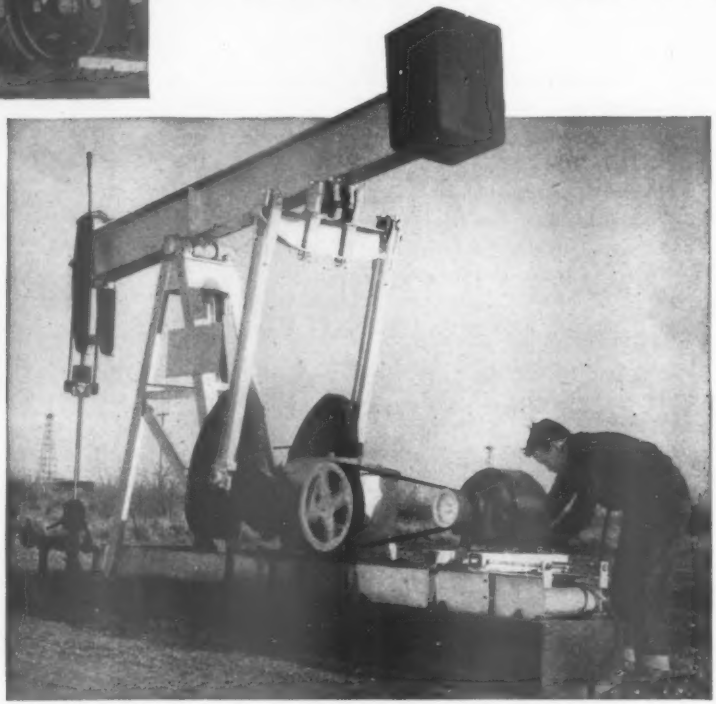
CHEMICAL

- Butanol
- Ethanol
- Ethylene Glycol
- Glycerin
- Hydroabietyl
- Isopropanol
- Methanol
- Phenol
- Propylene Glycol
- Acetaldehyde
- Formaldehyde
- Furfural
- Heptaldehyde
- Acetic acid
- Stearic, Palmitic, Maleic, Oleic acids
- Butyric acid
- Naphtha
- Ricinoleic acid
- Acetanilide
- Ammonia
- Hydrogen Cyanide
- Nitric acid (concentrated)
- Pyridine
- Hydrogen Sulfide
- Benzene
- Dichlorobenzene
- Gelatin
- Hydrogen Peroxide
- Turpentine
- Xylene

Use Alcoa Alclad 3S-H14 Heat Exchanger Tubes with fresh, brackish and salt-cooling waters

How much difference can this sheave make . . .

in this oil pumping job?



The man you see at this site can tell you—and so can hundreds of other oil-production men who have used the Worthington QD*.

Sheaves can be headaches. If they're made with solid hub, bored for tight fit on the shaft, they're tough to get off. If they're built with solid hub and loose bore for quick and easy removal, they often don't hold the shaft tight enough to withstand heavy shock loads without slipping. Not so with Worthington QD. Its unique two-piece design—*especially created to meet the demands of oil-production men*—makes it *easy to get on, easy to get off*. But with its heavy-duty, taper cone friction grip, it hugs that shaft *tight* against even the heaviest shock loads.

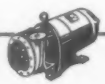
Local Worthington QD distributors in all oil-field areas are stocked-up in most sizes and they're backed up by factory stocks in Los Angeles, Fort Worth, Houston, Tulsa and New Orleans.

It'll pay you to STANDARDIZE on the Worthington QD. For more data, write for Bulletin V1400B7F to Worthington Corporation, Multi-V-Drive Sales Division, Buffalo, N. Y.

*Reg. U. S. Pat. Off.

MV.2.9

COMPRESSORS: AIR-COOLED, WATER-COOLED



PUMPS: CENTRIFUGAL, ROTARY, STEAM, POWER

MULTI-V-DRIVES: QD SHEAVES AND V-BELTS

VARIABLE SPEED DRIVES: WORTHINGTON ALLSPEED DRIVE, WORTHINGTON ALLSPEED MOTOR DRIVE

WORTHINGTON

Multi-V-Drives

Buy these Worthington standard products from your local distributor

How Shell Oil does its exploration, drilling, transporting and refining more efficiently with MOTOROLA 2-WAY RADIO

Motorola 2-way radio is the vital link in offshore drilling operation. Instant communication gets needed supplies, saves time in emergencies.

The widespread operations of Shell Oil Company depend upon Motorola 2-way radio for the fast, reliable communication that reaches key men in every area. Offshore drilling operations, exploration parties and docking facilities are linked together for the co-ordinated action that improves service and protects personnel.

Throughout the Petroleum Industry, Motorola is specified for low overall investment, reduced maintenance cost and top-notch performance. Rough-and-ready Motorola radios take the hardest shocks and jolts, deliver peak performance under all conditions. They're built for the future, too, with obsolescence-proof circuits that guarantee dependable service for years to come.

Central Station Console—the Key Control Point

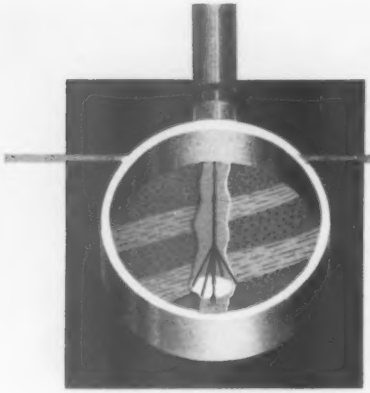
Conveniently located, easily operated console puts full transmitter power at your finger-tip. Microphone, speaker and clock are placed where you need them for fast dispatching and timed message-handling.

Handie-Talkie® Portable Radiophone

A complete 2-way radio ready for instant action wherever you go. Exploration parties find the *Handie-Talkie* radiophone indispensable. It's a *lightweight* in size, a *heavyweight* in performance.

Motorola

Communications & Electronics Division
4545 Augusta Blvd., Chicago 51, Illinois
Rogers Majestic Electronics Ltd., Toronto, Canada



SEE your well and save...

with HALLIBURTON'S ELECTRIC CALIPER!

Halliburton's Caliper Logs have saved millions of dollars by taking the guesswork out of important operations.

Formation caving causes errors in any computation. Wells have been lost for want of a caving profile, and since there is no other dependable way to measure the effect of drilling fluids, bits, and drill pipe on the formations penetrated, an Electric Caliper is an essential, economical investment!

Halliburton's Electric Caliper has four spring-driven arms, independent of each other, which are released to open position at the start of the run. As the Caliper is pulled up, these arms ride over the changing profile of the hole, transmitting all variations by electrical circuit through the well logging cable to a recording mechanism at the surface. The recording is made directly in inches at a logging speed of approximately 200 feet per minute.

Amazingly versatile, Halliburton's Electric Caliper pays for itself many times over in cementing, gravel packing, well shooting, casing perforating, acidizing, formation logging, and many other critical problems. Amplified Calipers make possible studies involving mud cake thickness. Your nearby Halliburton Representative has valuable data for your files regarding the many new uses for caliper logs. Or write to Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

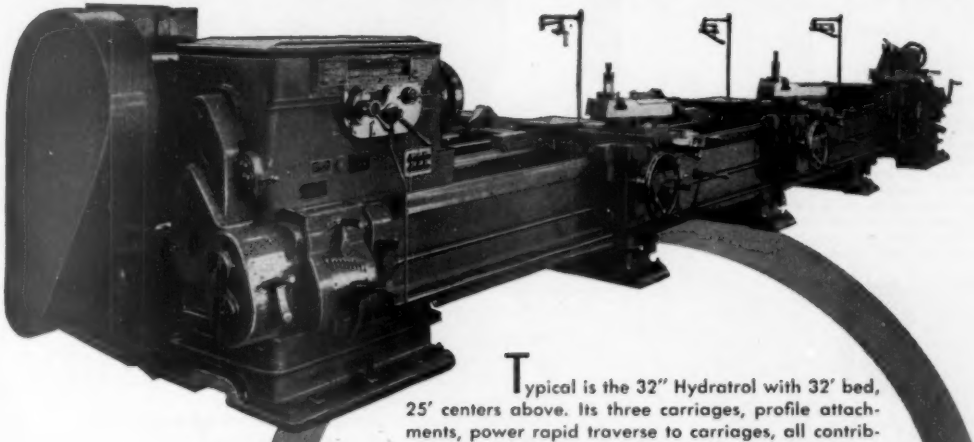
YEARS AHEAD IN WELL LOGGING TECHNIQUES!

Hydratrol Lathes

Again Helping Uncle Sam to Lower Costs and Increase Production!

LEHMANN'S VERSATILITY OF DESIGN

Machines Gun Tubes Better and Faster



Typical is the 32" Hydratrol with 32' bed, 25' centers above. Its three carriages, profile attachments, power rapid traverse to carriages, all contribute to doing the rough and finish turning of the O. D. on gun tubes better and faster.

CHECK THESE STANDARD FEATURES

- Hydraulically operated speed changes.
- Simplicity in construction, simplicity and safety in operation.
- Automatic Slide Rule indicates spindle speeds, operation numbers, cutting speed.
- Self-compensating hydraulic friction clutches and brakes.
- Speed changes through positive clutches, gears remaining in constant mesh.
- Spindle release for chucking.
- Perfect, safety control lubrication with filtered oil.

Six Sizes

Medium Duty 16"-18"
Heavy Duty 20"-25"
Heavy Duty 32"-36"
Heavy Duty 40"-50"

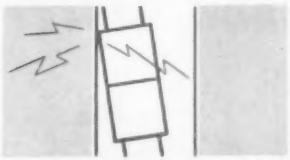
Lehmann
MACHINE COMPANY

CHOUTEAU AT GRAND • ST. LOUIS 3, MO.

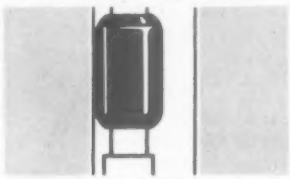
PB *protection notes*

Would you drill 88 feet with a #66 drill?

Imagine that you have to drill a scale model 12,000' well (4½" O.D drill pipe) using only a hand drill and the appropriate scale size wire drill. If your hand drill is one foot in length and a standard derrick 136' high, the scale factor is 1:136. Your scale well would be 88" deep—and your drill wire only 0.033" in diameter (a #66 wire drill). The magnitude of your scale drilling problem is plain to see, but it's obvious that eliminating friction is the key to the problem. And friction is one of the problems to beat in deep well drilling, too.



WHY PROTECTORS. Tool Joints are nearly always oversize to provide extra wear at the connection, where contact with the casing takes place. Drill pipe under compression whips as it rotates inside the casing—and joints rub against the casing walls.
It's the metal-to-metal wear that causes friction—and friction may mean corkscrewing, twist-offs and costly fishing operations. But



wear on casing and tool joints is the greatest expense because both are almost unreplaceable today. Casing frequently represents more than a third of the total drilling cost per well—a big investment. No wonder protection is important.

GOODBYE WEAR. A PB Casing Protector installed above each tool joint protects casing and drill pipe because joints are held away from casing walls and there is less friction. The protectors act as rubber bearings. (Figure Two) PB Protectors do not restrict mud flow or hang up on pipe wipers when pulling the string. Saving time, money and equipment often means the difference between profit or loss. You can't afford to be without maximum protection for your rig. Get maximum protection by installing PB Casing Protectors today!

Your Protection is our Business

your ace in the hole

PB casing protectors

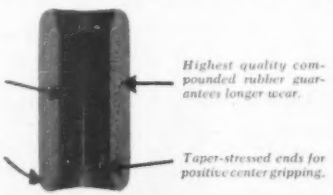
...prevent wear on casing and tool joints

Current steel restrictions make stakes high in this game... you can minimize your chances of damage to casing and drill pipe with PB Casing Protectors ... your ace in the hole.

PB Protectors...

Prevent metal-to-metal wear—save casing
Protect tool joints and drill pipe
Lower vibration, friction and torque
Eliminate danger of bent pipe, corkscrewing and twist-offs
Increase drilling speeds—cut drilling time per job—
Give greater control of weight on the bit

Don't gamble with your hard-to-get casing and drill pipe! Install PB Casing Protectors today—and save! See your BJ-PB Representative.

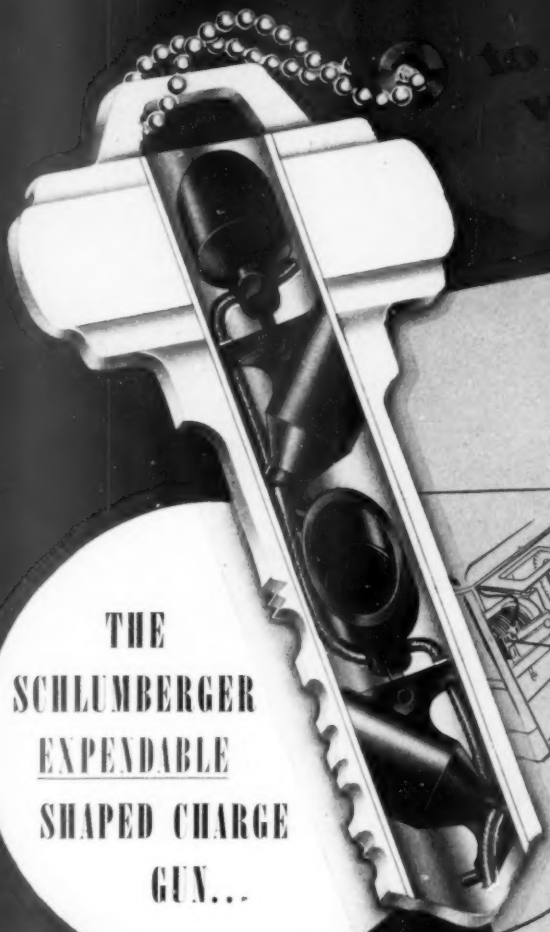

Positive grip center section insures that protector stays put!
Tear resistant ends, streamlined to permit smooth mud flow around protectors.
Highest quality compounded rubber guarantees longer wear.
Taper-stressed ends for positive center gripping.

Available through your supply store

PB OIL FIELD & INDUSTRIAL SPECIALTIES

PB DIVISION
Byron Jackson Co.

Your Key to a Revolutionary Well Completion Technique



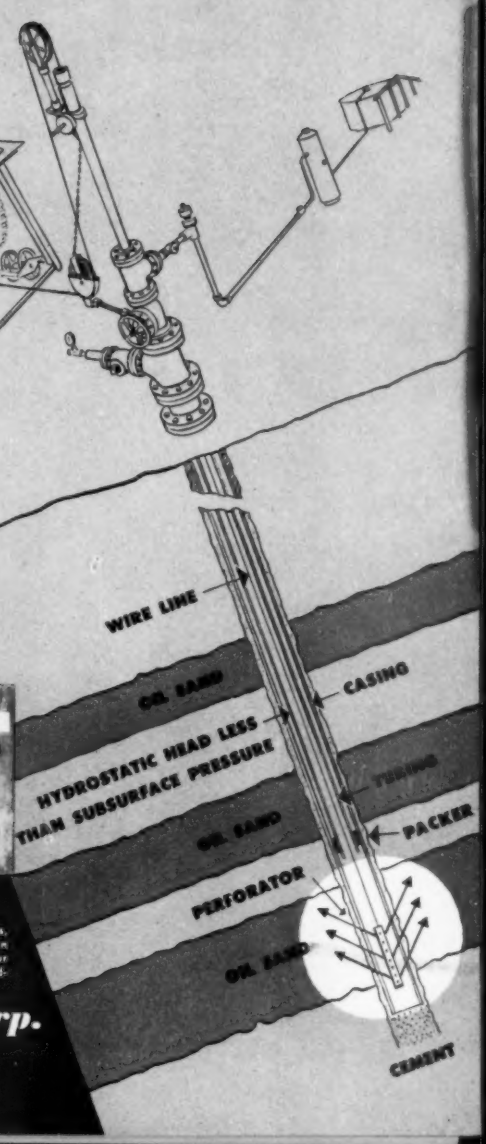
THE SCHLUMBERGER EXPENDABLE SHAPED CHARGE GUN...

. . . An exclusive Schlumberger service, which opens the door to permanent type well completions at radically reduced costs.

A perforator—1¾" in diameter and 5 shots per foot—designed to run through 2" tubing and perforate the casing below . . . Allows the operator to SET TUBING, SWAB MUD, REMOVE RIG AND INSTALL WELL HEAD EQUIPMENT . . . All prior to perforating. Resulting advantages are:

1. *NO FORMATION CONTAMINATION*—Low fluid level at time of shooting allows immediate formation flow.
2. *WORKOVER EXPENSES CUT*—Unnecessary to kill well or pull tubing.
3. *COSTLY RIG TIME SAVED ON NEW WELLS*—Rig can be removed prior to perforating.
4. *INCREASED SAFETY*—Tubing and well head equipment installed before well is perforated.

Because of material shortages, equipment is available in limited areas only. Call your Schlumberger Engineer for additional information.



Schlumberger Well Surveying Corp.

HOUSTON

FIRST in the Field FOREMOST in Research

BEAIRD
Ingersoll-Rand

Packaged Compressor Plant

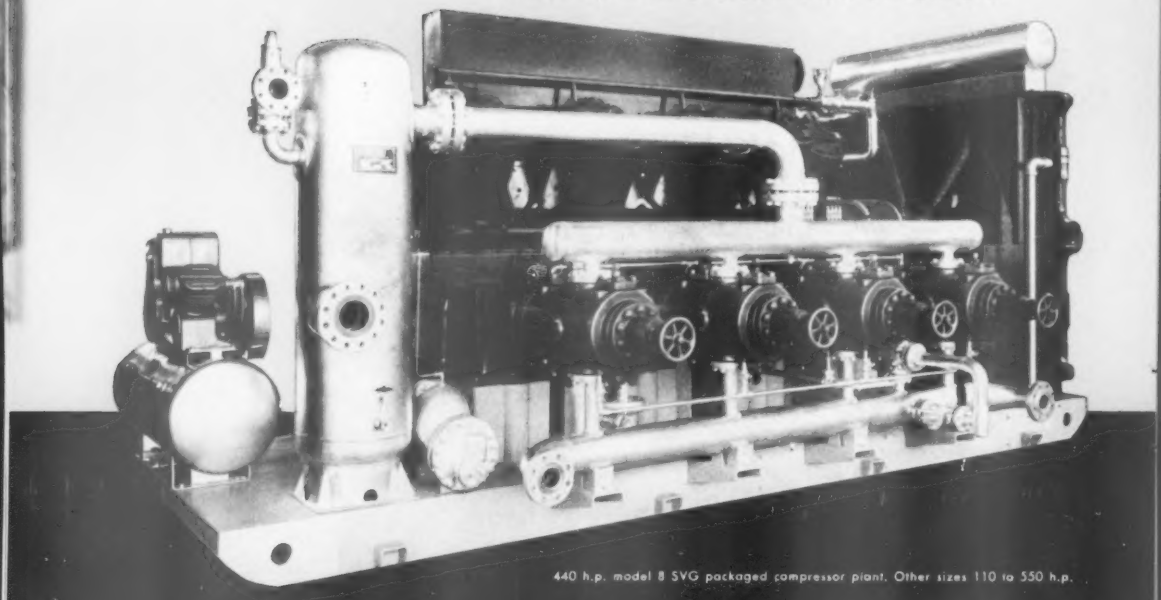
How Complete Packaging saved over 30% on installation cost of one compressor station

Actual comparative costs were made recently between a packaged compressor installation and a permanent type installation, for repressuring service in a Southwest field. With a requirement of approximately 3,000 horsepower, it was found that Beaird-Ingersoll-Rand packaged compressor plants could be installed for 30% less than the cost of a permanent compressor station.

The saving is achieved by centralized purchasing, fabricating and complete assembly at the factory, rather than by use of expensive field assembly. The cost of housing for operators was also avoided because automatic controls on the packaged units made regular attendants unnecessary.

An added economy will be afforded by packaged units in the future when the plant is expanded. The capacity of the plant may be increased by simply installing additional Beaird-Ingersoll-Rand packaged compressor plants, without expensive remodeling of the entire station.

Write for information on the economy of complete packaging.



440 h.p. model 8 SVG packaged compressor plant. Other sizes 110 to 550 h.p.

LOWEST COST PER HORSEPOWER, INSTALLED

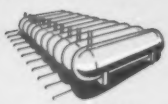
BEAIRD

THE J. A. BEAIRD COMPANY, INC. Shreveport, Louisiana

L P GAS SYSTEMS

CAST STEEL FITTINGS

ANHYDROUS AMMONIA EQUIPMENT



PRESSURE BULK STORAGE

They Say—

Needed: Gunboat Diplomacy

"Iran dealt foreign exploration a hard blow last year, as Mexico did a quarter of a century ago. The confidence of the oil world and the investing world has been badly shaken . . .

"Where may it happen next? It can happen in any country that has not grown up enough to recognize the sanctity of its contracts, a recognition basic to honesty and fair dealing among men.

"What countries have reached such political maturity? . . . The list is short . . . The United States, Canada, Israel, India, Pakistan, Afghanistan . . . If the list is dismally short, it only shows that keeping faith is not a universal habit among nations.

"Is there no means of enforcing a contract between a government and an oil company?

"The Court of International Justice may some day be an effective tribunal, if its jurisdiction extends to disputes between governments and those with whom they contract, and if all concerned come to accept its decisions. At present it meets neither of those tests.

"There was a recognized rule of international law and practice for such cases. It held that a country protected the persons and property of its citizens wherever they went, and property included contract rights.

"The rule remains; the practice has grown more and more feeble. It has yielded bit by bit to a new theory: that we should not tell another country what it may or may not do to our citizens; that to do so would be interference in its internal affairs.

"The fashion of today is to sneer at the former practice, to call it 'gunboat diplomacy.' The term sounds damnable, but is a gunboat, used to enforce honesty and fair dealing, more damnable than a court order or a policeman? . . .

"I do not envy our State Department its job of deciding whether and when to be firm and when to appease; whether and when to protect the rights of American citizens abroad; whether and when to insist that contracts made in good faith be kept; whether and when to permit other countries whose citizens are wronged to do the same.

"I suggest, however, that unless the political risks in some parts of the world are reduced, unless governments once more support the rights of their nationals abroad, unless oil men can again have confidence in such support, the free world's oil needs may not be fully met."

Max Ball, consultant, addressing the Washington, D. C., chapter of the American Institute of Mining and Metallurgical Engineers.

Helpful Report:

Sir:

Articles of the type of that written by Roy F. Carlson under the title of "Drilling and Producing Regulations of the Texas Railroad Commission" and appearing in your issue of November 24 are, I think, particularly helpful to individuals like myself who must rely on the staffs of our district offices to handle details of our relations with state regulatory bodies and who like to keep acquainted with what those bodies are doing and be able to understand what is involved when changes in rules or special application of existing rules are under discussion.

If reprints of Mr. Carlson's article are made, I would appreciate having two or three copies sent to me at this office. I would like to have one for my own reference, and I am sure that the

You Can't Diagram WESTERN SERVICE

With a line here, a figure there—an engineer can graphically show you where a heat exchanger is to go . . . the job it's supposed to do . . . and how well it will do that job! But what about all the steps that came FIRST—sizing and rating . . . tailoring to specification . . . fabrication and testing . . . shipping on a pre-planned schedule—Mister, THAT TAKES SERVICE and you can't put THAT on paper. The Heat Transfer Engineering service of Western Supply Company can save YOU valuable time. For replacements or new installations of any type of heat transfer equipment — CHECK WITH WESTERN.

Information on Western's service and fabrication facilities will be sent upon your request.

WESTERN HEAT EXCHANGERS

Manufactured by

WESTERN SUPPLY COMPANY

P.O. BOX 1888 TULSA, OKLAHOMA

attorneys who work with me in the office would find the article helpful.

Ernest R. Lilley
Great Lakes Carbon Corp.
New York.

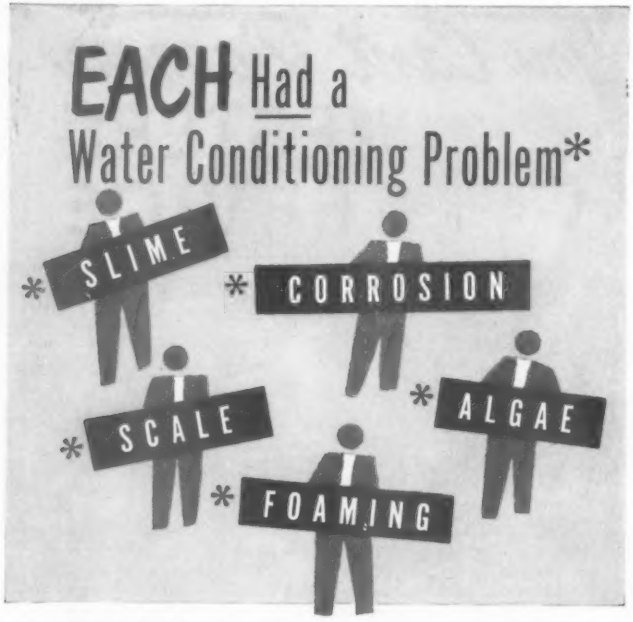
Let's Have More; Let Oil Pay

"Expenditures for what are proposed as essential state projects for the next biennium indicate that $140,000,000 will be required in new revenue. If industry as a whole would but recognize the cost of running the state government as a joint obligation with each unit sharing on a basis commensurate with benefits received, there would be no undue burden on any particular group or industry; which, under the constitution, is the way the cost should be allocated.

"There are over 130 trade associations with representatives in Austin. 'Business Statesmanship' would demand that these various groups offer their services, brains, and talents to the governor and legislature in working out a solution to the state's financial problems.

"But if, as in the past, the various industrial units spend their time, effort and money in attempting to avoid payment of their fair share of the cost of government, then it will be the same old 'dog eat dog' war with the oil and gas industry against the field. They all favor more and better everything in Texas—schools, colleges, asylums, prisons, roads and what-have-you — but they likewise want someone else to pay for them. And yet we have the disastrous experience of a few short years ago, when oil production was cut in half and put the state in the red, as a glaring example of the fallacy of tying the state's finances into the economy of one industry."

Tipro Topics, published by the Texas Independent Producers and Royalty Owners Association.



EACH Found the Answer at Wright!

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CALENDAR OF EVENTS

DEC.

11-12 Texas Petroleum Research Committee, fifth oil-recovery conference, Memorial Student Center, A. & M. College, College Station, Tex.

1953

JAN.

8- 9 Midwest Research Institute, symposium on automatic computing equipment, Kansas City.

15 American Institute of Chemists and American Chemical Society, symposium on public relations for chemists and chemical engineers, Hotel Commodore, New York City.

16-17 Independent Petroleum Association of America executive committee, quarterly meeting, The Campbell House, Lexington, Ky.

19-21 Pipe Line Contractors Association, fifth annual convention and exhibit, Shamrock Hotel, Houston.

19-22 American Society of Mechanical Engineers, and Society for Advancement, Plant Maintenance Conference, Public Auditorium, Cleveland.

19-23 American Institute of Electrical Engineers, winter general meeting, Hotel Statler, New York.

28-30 Symposium on Instrumentation for the Process Industries, Agricultural and Mechanical College of Texas, College Station.

FEB.

2- 6 Corrosion short course, sponsored by National Association of Corrosion Engineers, University of California, Berkeley.

5- 7 Missouri Petroleum Association convention, President Hotel, St. Louis.

16-21 American Institute of Mining and Metallurgical Engineers, annual joint meeting of petroleum, metals, and mining branches, Statler Hotel, Los Angeles.

18 Instrument Society of America, sixth annual New York regional meeting, Hotel Statler, New York.

18-19 Pacific Coast Gas Association, technical services conference of technical section, Hollywood, Calif.

27 Natural Gasoline Association of America, regional meeting, Scharbauer Hotel, Midland, Tex.

FLASH*

* **WEBSTER:** *To break forth in or like a sudden flame; to flare for a moment. To come to pass like a flash. To act, speak, perform, etc. with the suddenness, unexpectedness, or conspicuousness of a flash.*

When the flash is stock tank shrinkage . . . profits vanishing to thin air . . . it's time to install low cost field stabilization.

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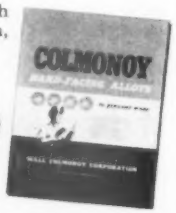
Write us for the name of the nearest shop doing Spraywald work. Write, too, for Hard-Facing Manual No. 77. It gives the characteristics of all Colmonoy alloys, and typical jobs on which they are used; also full information on the Spraywald Process. Engineering Data Sheet No. 3 lists the many acids and alkalies which Colmonoy nickel-base alloys will resist. Write today!



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MAR.

2- 6 American Society for Testing Materials, spring meeting, Statler Hotel, Detroit.

4- 6 American Petroleum Institute, division of production, Southwestern district spring meeting, Hilton Hotel, Fort Worth.

8-11 American Institute of Chemical Engineers, Buena Vista Hotel, Biloxi, Miss.

16-20 National Association of Corrosion Engineers, ninth annual conference and exhibition, Hotel Sherman, Chicago.

18-20 American Petroleum Institute, division of production, Mid-Continent district meeting Mayo Hotel, Tulsa.

23-25 Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

23-26 American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, joint annual meeting, Sam Houston Coliseum, Houston.

30-31 Texas Independent Producers and Royalty Owners Association, annual meeting, San Antonio.

30-Apr. 1 Mid-West Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

APR.

8-10 American Petroleum Institute, division of production, Eastern district meeting, William Penn Hotel, Pittsburgh.

15-17 National Petroleum Association, mid-year meeting, Cleveland.

21-23 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

24-25 Interstate Oil Compact Commission, 1953 spring meeting, Roosevelt Hotel, New Orleans.

26-29 American Institute of Chemical Engineers, Chemical Institute of Canada, joint meeting, Royal York Hotel, Toronto, Ont.

27-28 Independent Petroleum Association of America, mid-year meeting, Jefferson Hotel, St. Louis.

Apr. 29-May 1 Natural Gasoline Association of America, annual convention, Rice Hotel, Houston.

MAY

4- 5 American Petroleum Institute, division of marketing, midyear meeting, Baker Hotel, Dallas.

7- 8 American Petroleum Institute, Rocky Mountain district, Division of Production, spring meeting, Gladstone Hotel, Casper.

11-13 Southern Gas Association, Jung Hotel, Hotel, New Orleans.

11-14 American Petroleum Institute, Division of Refining, midyear meeting, New York.

13-14 Pacific Coast Gas Association, annual gas supply and transmission conference, Santa Barbara, Calif.

14-23 International Petroleum Exposition, Tulsa.

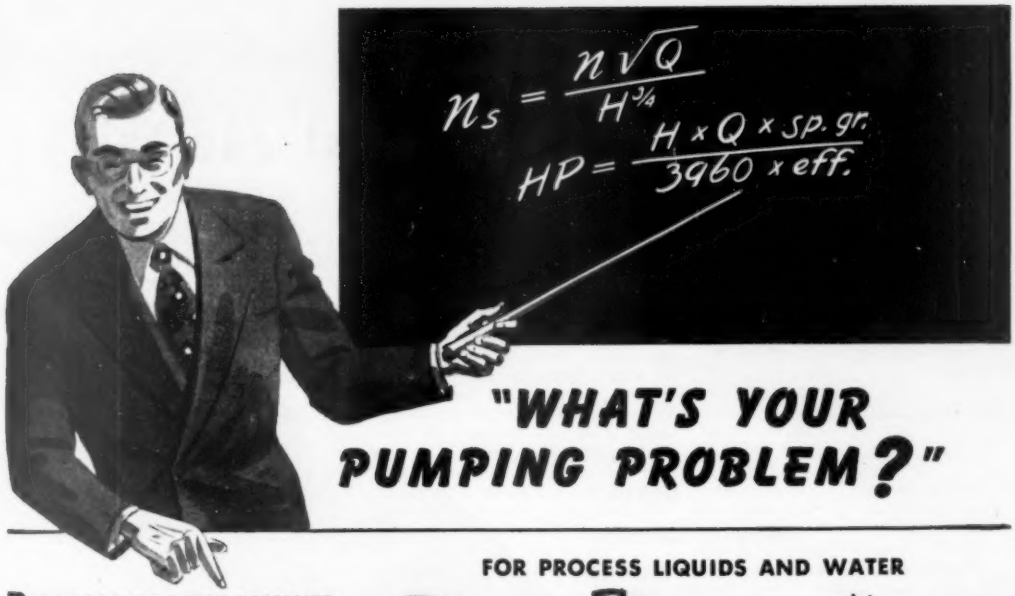
15-16 International Gas Union, council meeting, Paris, France.

24-27 American Gas Association, production and chemical conference, Hotel New Yorker, New York City.

28-29 Natural Gas and Petroleum Association of Canada, London, Ont.

JUNE

2- 3 American Petroleum Institute, Division of Production, Pacific Coast District, Statler Hotel, Los Angeles.



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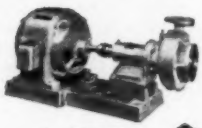

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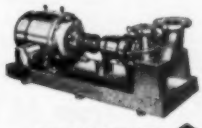

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Center-line-mount pump for elevated temperatures and pressures. Request Bulletin B-1605.

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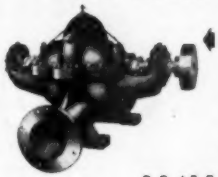

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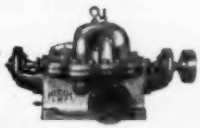

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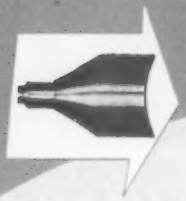

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TULSA, OKLAHOMA

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JOURNALLY Speaking

Time on Amerada

DID you read that piece about Amerada Petroleum Corp. in last week's Time magazine? As usual when a popular magazine runs a yarn on oil most people in the industry can find a few technical flaws or misuse of terms. We've heard some criticism to the effect that this story made it sound too easy to find oil, or gave the impression that Amerada succeeds where other companies fail.

Our own reaction is that stories like this one are all to the good because they give the general public some idea of what it takes to keep the oil industry going.

In the first place, it shows the value of specialization. As Time pointed out, Amerada is not a complete oil company but devotes its entire attention to one phase—getting crude oil—and it has become good at its specialty. Integrated operations have a very definite place in the oil industry and they have contributed mightily to progress, but the history of Amerada and hundreds of other independents in all branches of the industry shows that a smaller outfit can make a place for itself and often teach things to the majors by specializing on one thing.

In the second place, this story emphasizes the gamble in oil finding and the tremendous stakes involved. It takes huge sums of capital and the willingness of investors to take big risks, to write off costly failures and then make another plunge in the hope of hitting the jackpot. The lesson which the general reader should have got is that there won't be any more Williston basins or other big discoveries if government tax and other policies prevent oil men from accumulating big stakes for this purpose or take away the incentive to risk money. Neither Amerada nor any other company would find much oil if its earnings were limited to the level of a "sure thing" investment like a mortgage or a public utility.

In the third place, the Time article mentioned, though didn't stress enough, the research that Amerada's founders did on methods of finding oil. Under its policy of specializing on one thing and taking risks with its venture, Amerada poured millions into experiments with new ways of finding favorable places to drill for oil. Its pioneering in geophysics paid off handsomely for it and also for the rest of the industry and the general public, for its methods are now in general use.

Sure, Amerada had some good luck. But it also had a lot of failures which are generally forgotten. That's the way it is in any dynamic business. What counts is to learn something from every failure and then try again. There always will be an element of luck in exploration, but Amerada — and many others — have learned how to minimize it through scientific research. So long as oil men are encouraged to gamble both on research and on wildcatting, there will be room for plenty of Ameradas in the oil industry and there will be plenty of oil for the nation.

A Letter or Two

DOGGONE it, you can't win in this editing business. Every time you make an itzy bitzy mistake somebody jumps you. Engineers, of course, have to get their decimal points in the right places, but most everybody else is allowed to make a mistake now and them. An oil man can drill a dry hole without being in disgrace, but an editor loses his entire face if he gets a couple of letters in the wrong places.

Couple of weeks ago we misspelled "mispronunciation" (had it "mispronounciation") and two readers exercised their constitutional prerogatives of freedom of the press to call us on it. But we don't mind. It shows that we have at least two readers, and careful readers at that. Like an actor or a politician, an editor would rather get some criticism than endure the awful silence of wondering whether anybody ever reads his stuff anyway.

At times editors have been accused of putting in errors on purpose just to see if anybody noticed them, but we swear we never do. We can make enough mistakes without trying.

Henry D. Ralph.

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Baker DUPLEX Cement Wash-Down Whirler Float Shoe — Product No. 360

WHAT YOU CAN DO WITH BAKER DUPLEX EQUIPMENT

successfully cement liners, combination strings, and perform certain types of two-stage cementing.

cement blank sections of pipe below a perforated section, without any need to use auxiliary equipment.

wash out cavings ahead of the string when setting a liner. Without DUPLEX Equipment you can circulate only through the topmost perforations—with DUPLEX you can circulate clear to bottom.

you can control the amounts of materials used, and (without change) run caustic or oil, then run plastic, in sequences and quantities as desired.

you eliminate the need for auxiliary equipment (such as retainers or retrievable cementers) when you use Baker DUPLEX.

you can use DUPLEX equipment either with or without a liner hanger.

you have complete control of the liner at all times when DUPLEX Equipment is used. The liner can be raised or lowered, and is positively held down in place while cementing

a bridging ball can be dropped (after cementing) and circulation carried on above the DUPLEX Equipment without disturbing the green cement.

Baker Combination Product No. 383 with a DUPLEX Whirler Float Collar. Cement is held above the Metal Petal Basket.

How DUPLEX Equipment is made

DUPLEX Float Shoes and Collars are similar to other Baker Float Shoes and Collars in most features, but have a female left-hand thread assembly (of drillable cast iron) accurately anchored just above the Back-Pressure Valve. By means of a mating male Left-Hand Square Thread Sub, the cementing string is easily connected to (or disconnected from) the DUPLEX Shoe or Collar.

How DUPLEX Equipment Operates

In simple liner work, a DUPLEX Wash-Down Whirler Float Shoe is connected to the bottom joint and the balance of the liner is run into the well, with the last joint held in slips or clamps. A cementing string of sufficient length then is run to connect the male Left-Hand Square Thread Sub to the female left-hand assembly in the shoe, to form a quick, fluid-tight connection.

The portion of the cementing string above the liner is then run, with the DUPLEX connection carrying the weight of the liner. After cementing, the back-pressure valve prevents any flow-back of cement slurry placed outside the liner. The cementing string is then disconnected by rotating to the *right;* excess cement washed out; and the cementing string removed from the well.

Various combinations of Baker DUPLEX Equipment are used to perform more complex operations, such as cementing behind liners at different levels; cementing above and below cavities; between producing zones; and similar work.

The Baker representative or office nearest you is available to discuss proper use of Baker DUPLEX Equipment in your well completions.

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Here's more evidence of our foreign bungling

LAST week's election in Venezuela brought to the ascendancy a political party which campaigned for nationalization of the oil industry and against "permitting monopolistic invasion of the national market by great international trusts".

There probably were many local issues and factors in that election, but there can be no doubt that the antagonism to the oil companies and "international trusts" was spurred on, if not entirely initiated, by the United States Government's charges that seven international oil companies operate as a "cartel".

This constitutes more evidence of the incalculable mischief done to American interests throughout the world by the sweeping and irresponsible nature of the cartel charges in this antitrust suit and the Federal Trade Commission report which preceded it.

HERE is a boomerang of tragic proportions. It is generally agreed that the cartel charges were published to influence an election. But the election in mind was that in the United States, and that election went against the party which brought the charges. Now it appears that the charges influenced a foreign election in a way which hurts all political groups in the United States except the Communist.

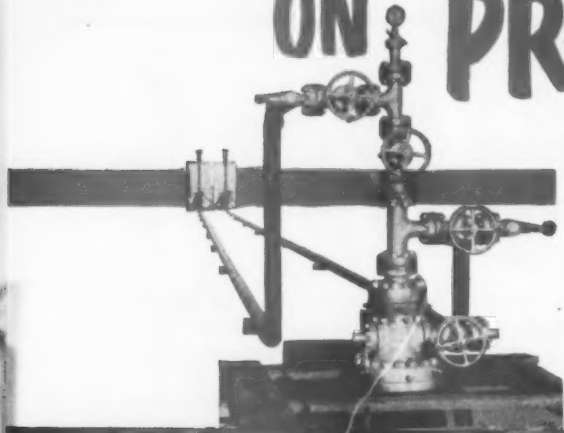
American voters laughed off the cartel charges; foreign voters are taking them seriously. In many other countries there are evidences that our Government's official characterization of American oil companies as greedy monopolists is feeding the flames of nationalism and socialism and undermining our basic foreign policy.

Among political parties in the United States there is no disagreement on the policy of strengthening the economic resources and political unity of the Free World. A major part of this policy is the encouragement of American capital and technology in foreign development of oil and other industries. This is a difficult task at best, but it is made almost impossible when our Government publicly attacks the leading instruments and exemplars of this policy.

ON January 20 a new administration will take office in this country with a mandate to clean up the mess in Washington. A large part of this mess is the inconsistent, wishy-washy foreign policy and short-sighted politicking for narrow ends, of which the cartel charges are an example.

At least some of the damage to our foreign policy can be undone if the new administration will retract the wild accusations against American oil firms operating abroad and let the world know that we really believe in the capitalistic system of private enterprise and its extension abroad.

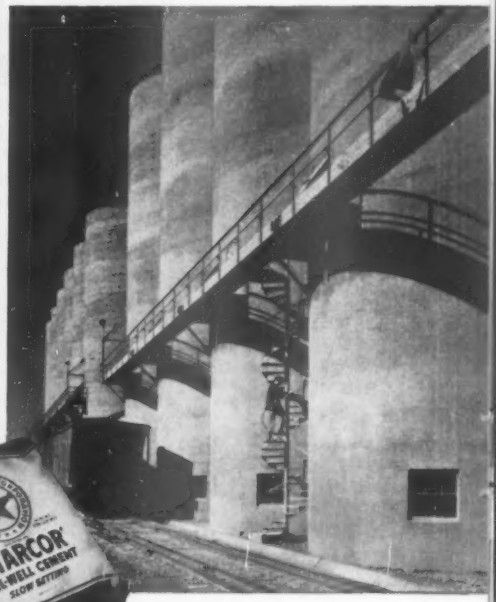
ON PRODUCTION



● "Christmas tree", flow lines and tanks... signal that the well is "on production" . . . oil starting on its long journey to the ultimate consumer.

"On production" at the cement plant is typified by the huge, concrete storage silos, each holding 40,000 sacks of cement...by the bulk cement flowing from the silo to the special covered railroad car...by the packing machines filling sacks for loading into boxcars.

Each brand or type of cement has its own storage silos and packing machine...quality cements to meet the varied requirements of the oil fields.



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THIS WEEK

INTERNATIONAL.—Oil industry uneasy over Venezuelan election. . . . Censorship prevented accurate determination of results immediately, but early returns shows unexpectedly strong support of U.R.D. party, which favors higher taxes on oil industry and which has hinted at nationalization. . . . ¶New Argentine crude-oil import quotas virtually exclude United States suppliers. . . . Quotas result from Argentina's acute dollar shortage, which forces country to get all materials possible from nondollar countries. . . . ¶Huge producing area southwest of Abqaiq field in Saudi Arabia named Ghawar field. . . . Single reservoir formerly was identified as Ain Dar, Uthmaniyah, and Shedgum fields. . . . Only producing area is Ain Dar, now flowing more than 300,000 bbl. daily from 50 wells.

PIPE LINES.—Interprovincial discloses it will build 30-in., 735-mile extension to its major Canadian crude line, extending it from Superior, Wis., to Sarnia, Ont. . . . PAD allocates steel for fourth-quarter construction. . . . ¶West Coast Pipe Line negotiating with Standard of California over plans for major crude artery from West Texas to California. . . . Whether project will get sufficient support of California refiners expected to be known shortly. . . . ¶PAD allocates 234,353 tons of steel for construction of crude and products lines in first quarter of 1953. . . . More than half of the total is assigned to West Coast Pipe Line and U. S. Pipe Line. . . . ¶Sinclair begins construction on new 85-mile, 12-in. products line from Houston refinery to Port Arthur. . . .

PRICES.—PAD recommends across-the-board increase in ceiling prices on California crude oil. . . . Report to OPS suggested no amounts but declares some increase is needed to provide incentive for operators to increase production. . . . Increase would create no shortage or need for price increase in any other area, PAD says. . . . ¶Higher ceiling prices for some L.P.G. asked of OPS by L.P.G. Industry Advisory Committee. . . .

ACTIVITY.—Production of crude and lease condensate averaged 6,663,000 bbl. daily for week ended November 29, up 9,700 bbl. daily. . . . ¶Total well completions for week decreased 38 wells to 855. . . . Wildcat completions gained 20 wells to 206 for the week. . . . ¶Rotary rigs operating in United States dropped 102 rigs during week ended December 1 to 2,624. . . .

TRENDS.—Refinery runs for the 3-week period ended November 29 averaged 7,105,000 bbl. daily or 401,000 bbl. daily greater than for same period last year. . . . Primary inventories of major products gained 4,128,000 bbl. for week ended November 29 compared with a decrease of 4,374,000 bbl. for same week last year. . . . Major product stocks are almost 24,000,000 bbl. greater than last year.

BARNACLE'S VIEW of pipe-line operations show a diver inspecting a flexible-hose connection during a flow test of an underwater line. The line is a 16-in. products carrier at St. Vincent, Cape Verde Islands, which will be used by tankers discharging products into coastal terminal facilities. Built by Shell Co. of Portugal, Ltd., the 3,300-ft. line was welded on shore and towed out to sea in a launching operation which was performed in only 40 minutes.

REFINING.—Union Oil Co. lets option on 1,000-acre proposed refinery site in Puget Sound area expire. . . . ¶Construction begun at Coleville, Sask., on 5,000-bbl. topping plant to process heavy crude from Coleville field. . . . ¶Husky lets contract for $1,000,000 program at Cody, Wyo., refinery. . . . Project involves installation of 1,000-bbl. cat reforming unit and an asphalt-vacuum unit. . . .

GOVERNMENT.—Companies accused by Justice Department of participating in international oil cartel must prove in District Court this week that other governments object to the disclosure of contracts and other vital records involving their nationals. . . . ¶Barge operators file suit to enjoin United States Pipe Line Co. from executing "guaranteed-tender" contracts as basis for operation of its proposed Texas-New Jersey products line. . . .

INDUSTRY.—Oil-Industry hunt for scarce uranium advocated by S.E.G., A.A.P.G., and S.E.P.M. . . . Five-point plan would involve checking for radioactivity of material removed from shot holes and first 500 ft. of drilling wells, use of gamma-ray logs, encouraging uranium alertness in oil geologists, and watching for evidence on gamma-ray logs.

PREFERRED ROUTE of Interprovincial's extension of its big crude line from Superior to Sarnia is shown by the heavy black line. Black triangles are refineries. Lines at right are those of Imperial Oil, Ltd., moving products from Sarnia to Hamilton and Toronto, and of Trans-Northern Pipe Line Co., moving products from Montreal to Toronto and Hamilton.

Big Crude Line Set

Interprovincial will expand system with 30-in. extension from Superior to Sarnia; completions scheduled next year

George Weber

NEW YORK.—Canada's Interprovincial Pipe Line Co. is now completing plans to extend its crude-oil pipeline system from Superior, Wis., to Sarnia, Ont.

The new extension is scheduled for completion before the end of 1953, according to T. S. Johnston, Interprovincial president.

Using the favored of two proposed routes, the extension would be 635 miles of 30-in. pipe. Initially, with a single pumping station at Superior, the line would deliver 83,500 bbl. per day at Sarnia. Future installation of additional pumping stations along its length would ultimately expand the line's capacity to 300,000 bbl. per day.

The Petroleum Administration for Defense last week announced that it has allocated 45,000 tons of line pipe for fourth-quarter delivery for the project.

The existing Interprovincial system will require considerable expansion to meet the ultimate capacity of the 30-in. section eastward from Superior. During 1953 the capacity of the existing line will be increased by laying 135 miles of 24-in. loop and by installation of additional pump-station horsepower for the section between Regina, Sask., and the United States border.

Proposed routes . . . Two routes have been under consideration. The shorter one traverses northern Wisconsin and Upper Michigan, crosses the Straits of Mackinac and extends southeastward through Lower Michigan to cross the St. Clair River from Port Huron to Sarnia. A possible alternate route to the south, around the Chicago area, is also being studied.

The northern route of about 635 miles is approximately 100 miles shorter and presents fewer problems in obtaining right-of-way. Despite the fact that it would involve a costly 4-mile crossing of the Straits, this route is understood to be the more likely choice.

The new link will be built and operated by Interprovincial's U. S. subsidiary, Lakehead Pipe Line Co., Inc., which operates the existing 324-mile section of the system from the Manitoba-North Dakota border to Superior.

What it means . . . The new pipe-line extension to eastern Ontario will contribute measurably to Canada's growing independence in oil.

During the open shipping season, Interprovincial delivers approximately 82,000 bbl. of crude per day to Superior for transshipment by Great Lakes tankers to the Sarnia and Toronto areas. When the tanker season closes for the winter, pipe-line runs to storage at Superior must be cut back to an average of 40,000 to 50,000 bbl. per day until lake traffic reopens in the spring.

By eliminating the 4-month winter interruption in tanker movements, the new pipe-line extension alone will permit continuous operation of the Interprovincial system at near capacity, amounting to an increase of about 18 per cent in year-round deliveries of Alberta crude.

In long range, the eventual expansion of capacity throughout the 1,750-mile Interprovincial-Lakehead system from Edmonton to Sarnia will provide a growing outlet for western Canadian crude to expanding refineries in southern Ontario. By thus stepping up the supply of domestic crude for the large eastern market, Interprovincial will accelerate Canada's trend toward self-sufficiency in supplying her own petroleum demand.

Topping Plant Started

CALGARY.—Construction has been started by Refinery Operators, Ltd., on a 5,000-bbl. topping plant at Coleville, Sask.

The plant is being built under an agreement between Refinery Operators

and Royalite Oil Co. It will be financed and operated by Refinery Operators and will process heavy crude from Coleville field, operated by Royalite. The plant will be an 80-acre tract leased from Royalite.

The topping plant is scheduled to be on stream by next April 1. Storage capacity of 300,000 bbl. is planned.

Majority interest in Coleville field is jointly owned by Royalite and Canada Southern Oils, Ltd. There are now 60 producing wells, but it is planned to drill additional wells to meet the refinery demand. Gravity of the oil is 14° A.P.I.

Coleville is 37 miles east of the Alberta-Saskatchewan border.

Gas Exports Endorsed

Alberta's controlling political party passes resolution urging export as only way to build petrochemical industry

EDMONTON. — A resolution calling for the export of surplus natural gas from Alberta and for expediting the production and distribution of the products from Pincher Creek field has been adopted by the Social Credit League, the political party in control of the provincial government.

The League is responsible for Alberta's Gas Resources Preservation Act, enacted in 1949, which prohibits the export of natural gas except under special permit. One of the organization's political planks has been the retention of gas in Alberta for local use and to attract new industries to the province.

The resolution was adopted following an address by Premier Ernest Manning, head of the Social Credit Party, in which he pointed out that new markets for gas are necessary for continued development of the petroleum resources of the province.

Permit probable . . . Manning's statements, plus the endorsement of his party leaders, are considered to make it highly probable that a permit to build a gas pipe line from Pincher Creek and other fields of southern and central Alberta will be granted when the Petroleum and Natural Gas Conservation Board holds its next hearing on the subject, now scheduled for April 1.

At present the only important export permit is held by Westcoast Transmission Co., which proposes to build a line from the Peace River fields of northern Alberta to Vancouver, B. C., and into the states of Washington and Oregon, but construction has not started because approval for the United States portion of the line has not yet been obtained from the U. S. Federal Power Commission.

Manning said Alberta has reached a point where it is important to encourage the export of natural-gas surplus. He said that because of lack of export a tremendously rich area at Pincher Creek in southern Alberta has had to be closed in.

Export a must . . . Manning said there isn't a possibility of obtaining these products until an export market is found for the gas.

He said that persons who claim industry will be attracted away from Alberta if gas is exported are overlooking the fact that government legislation provides that Alberta gas will be stripped down to residual gas before it leaves the province. It will therefore be only usable as fuel.

Manning warned that lack of gas export could retard the petroleum industry in Alberta. He said if there is nothing that can be done with gas found in oil and gas drilling, producers have to cap their $100,000 and $200,000 gas wells and tie up that money without opportunity of return.

"Soon we are going to have millions of dollars tied up in this fashion to the detriment of the development of our resources," Manning said.

Trans Mountain Work Halts

VANCOUVER.—Construction work on the 711-mile Trans Mountain crude line was halted for the winter December 1 with 325 miles of pipe in the ground.

In an announcement of the suspension of pipe laying, Canadian Bechtel, Ltd., agents for Trans Mountain Oil Pipe Line Co., said work will continue on the pump stations at Edmonton and Marlboro, Alta., and a Kamloops, B. C., where station exteriors have been completed.

The Trans Mountain line, which will take Alberta crude oil westward to the refineries in the Puget Sound region, is scheduled for completion in August 1953. Oil is scheduled to begin moving to Pacific coastal points in October next year.

Of the 72 river and creek crossings involved in the construction project, 50 have already been made, Canadian Bechtel said. Several crossings were left until recently, since water is at its lowest during late fall and winter.

Completed sections of pipe will be tested with air. This program will begin in April and will continue until the line is completed.

Petrochemical Outlook

Alberta, envious of Gulf Coast development, looks to its natural gas as the raw material for a big new industry

Henry D. Ralph

THE prospect of a big petrochemical industry is one of the important factors involved in the future development of Alberta's natural gas, and the plants recently completed and under construction have raised the province's hope of industrialization based on natural-gas byproducts.

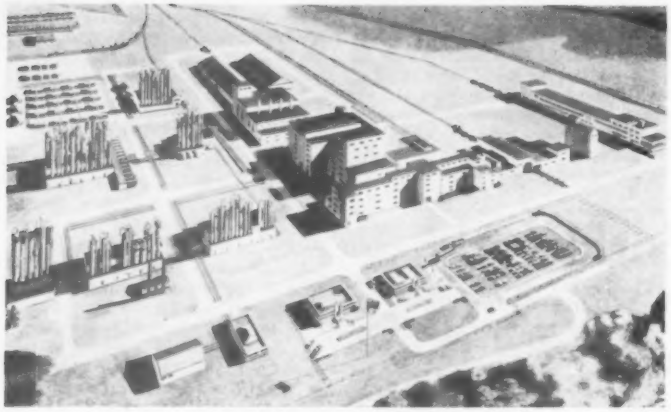
The demand that gas be kept at home to attract industries to this primarily agricultural region has been one of the main reasons why the Alberta government has so far prohibited exports of gas except from the Peace River area in the far north.

Now that the petrochemical industry appears to have a firm foothold in Alberta there is a growing realization that an export market for the dry gas must go hand in hand with the construction and operation of plants to strip and process the liquid products—natural gasoline, propane, butane, and related and derivative chemicals.

Alberta eyes enviously the petrochemical development of the Texas Gulf Coast and the Sarnia area of Ontario, and feels that its abundant supplies of raw material should offset its lack of water transportation and its presently small local industrial market for chemical products.

The more realistic observers point out that for some time to come likelihood is that the chief petrochemicals which can be produced in Alberta profitably are those for which cheap raw materials are more important than transportation costs of the finished products.

Nevertheless, in spite of the marketing handicaps, the petrochemical industry has made a good start in the province and its prospects for growth



CANADA'S NEWEST petrochemical plant is that of Canadian Chemical Co., Ltd., at Edmonton, now nearing completion. This artist's sketch shows the layout of the plant, which will produce petrochemicals, cellulose acetate, acetate filament yarn, and acetate staple fiber.

are good if, as, and when the government sanctions the export of stripped gas from central and southern fields.

New petrochem plants . . . The biggest petrochemical project in Alberta is that of Canadian Chemical Co., Ltd., now nearing completion on a 430-acre site near Edmonton, which will produce acetic acid and a number of other chemicals from propane and butane. The concern is an affiliate of Celanese Corp. of America, and the Edmonton plant will be similar to that of the parent company at Bishop, Tex.

Another affiliate, Columbia Cellulose Co., Ltd., recently opened a plant making high-grade cellulose from wood pulp at Prince Rupert, B. C., and much of this product will be shipped to Edmonton to be treated with acetic acid to make cellulose acetate, the basis for synthetic textiles. Approximately $50,000,000 is being invested in this petrochemical and textile project.

This plant is scheduled to utilize the equivalent of 75,000 gal. daily of liquefied propanes and butanes, part from natural-gasoline plants and part from refinery streams of nearby Edmonton refineries. When in full operation the plant will produce 25,000,000 lb. of cellulose acetate flake, 10,000,000 lb. of staple fiber, and 5,000,000 lb. of acetate filament yarn annually, and will employ more than 700 people.

In addition to chemicals consumed in textile production, this plant will manufacture for sale a number of other chemicals, including, formaldehyde, acetaldehyde, propionaldehyde, acrolein, propylene oxide, methanol, acetone, pentaerythritol, acetic acid, propylene glycol, n-butanol, and others.

Another petrochemical plant now under construction near Edmonton is that of Canadian Industries, Ltd., an associate of Imperial Chemical Industries, the big British firm. This $14,000,000 plant will process 10,000,000 cu. ft. per day of residue natural gas from the Devon conservation plant in Leduc field for the extraction of ethane which will be cracked into ethylene and polymerized into polyethylene, the basis of a versatile and fast-growing plastic. It is presently planned to ship the polyethylene flake to eastern Canada for plastics manufacture.

Still another gas-using plant which will have petrochemicals byproducts is being built by Sherritt Gordon Mines, Ltd., at Fort Saskatchewan, a few miles east of Edmonton, at an estimated cost of $17,000,000. The primary purpose of this plant is to refine copper, nickel, and cobalt ores. Within a few years' time it will be using 7,000,000 cu. ft. of gas daily, and the products stripped from the gas will be utilized to make ammonia, ammonium sulphate, and copper sulfide.

Near Calgary, Canadian Industries, Ltd., has just completed a $4,500,000 explosives plant, utilizing nitrogen obtained from natural gas.

The pioneer petrochemical plant in Alberta is the 10-year-old nitrogen plant of Consolidated Mining & Smelting Co. near Calgary. This currently produces about 90,000 tons of ammonia annually from natural gas, the bulk of which is made into ammonium nitrate fertilizer.

Sulfur plants . . . Not strictly petrochemical but in the same general category are Alberta's two plants producing elemental sulfur from the hydrogen sulfide stripped from natural gas. The first of these was built by Shell Oil Co. at Jumping Pound, with a capacity of 10,000 long tons a year. This was followed by the 9,000-ton plant of Royalite Oil Co. in Turner Valley field.

The big Pincher Creek field *(The Oil and Gas Journal, December 1, page 60)* and some other gas fields not yet in production will also require sulfur-extraction plants. Shell's recent discovery at Okotoks, just south of Calgary, has a gas which is 35 per cent sulfur and Shell is considering installing a Girdler-process plant like that at Worland, Wyo.

L.P.G. outlook . . . The use of "bottled gas" in Alberta is very small at present, but the potential market is huge because of the large farming operations and the many small communities which cannot economically be reached by gas mains. The opening of shut-in fields to supply a big gas-transmission line will require the construction of many L.P.G. plants, since many of the fields which will feed such a line produce "wet" gas and the Alberta conservation laws require recovery of all usable products.

With the petrochemical industry already off to a running start in the province, Albertans confidently expect to see within a few years not only more plants of the same general nature but a host of satellite and ancillary industries utilizing the basic petrochemicals and supplying other chemicals for use in the various processes and for combination with petrochemicals.

Such expansion, of course, depends on the availability of the byproducts of dry pipe-line gas, and the attractive prospect of Alberta as a huge chemical center is being used as one of the arguments for early approval of an export permit to allow construction of a big natural-gas pipe line to markets outside of the province.

ROCKY MOUNTAIN

Development Contract Signed

DALLAS. — Contract for development of M. B. Rudman properties in North Dakota's Tioga and Beaver Lodge fields has been signed with New Concord Development Corp., Ltd., of Toronto, according to Raymond Williams, general manager of the Rudman properties.

Williams said New Concord, which already is drilling in the area, will move in two additional rigs for drilling to the Madison lime at 8,600 ft. The contract, which covers a 3-year period, also provides for drilling of seven wells to evaluate the upper and lower Devonian at 10,600 and 12,000 ft., Williams said.

PAD Backs Price Hike

OPS told existing West Coast crude price is causing the current shortage by acting as drag to production efforts

WASHINGTON. — An across-the-board increase in ceiling prices on California crude oil and refined products has been recommended to the Office of Price Stabilization by Deputy Petroleum Administrator J. E. Warren.

PAD's views on applications of Standard Oil Co. of California and Union Oil Co. of California for higher ceilings were requested by OPS in October. Its recommendation was submitted November 13 and was made public by PAD last week.

The recommendation carried no suggestion as to the amount of increases necessary, but it was pointed out that the delivered cost in California of Middle East, Venezuelan, or Gulf Coast crude is at least 65 to 75 cents per barrel in excess of established ceilings even at the most favorable long-term transportation rates obtainable and subsequently more than $1 per barrel on short-term transportation rates.

The PAD report explained that a severe shortage of crude and products in the California area has been averted only by the purchase by the military of 50,000 bbl. daily of its West Coast requirements from Gulf Coast and Caribbean ports at a substantial increase in cost of transportation and the importation by several refiners of approximately 37,000 bbl. daily of crude from foreign sources at excessive cost.

Even so, it said, it has not been possible to meet all military demands, although that phase of the situation might be taken care of by opening up Elk Hills production to the extent necessary to meet present requirements. This, however, would require congressional approval.

Drilling slump . . . The depressing effect of present ceilings on the industry is evidenced by the fact that the well-drilling rate in California since early 1951 has been considerably less than in former years when prices were higher "and responded to the dictates of supply and demand," PAD said.

The situation can be relieved only by increased development, exploratory, and secondary-recovery operations and by the importation of additional crude and products from other areas. But until crude prices are increased there will be no adequate incentive for such operations or imports, and unless product prices are increased along with crude the survival of independent refiners in the area will be threatened, the agency told OPS.

Completion of the Trans-Mountain Pipe Line in 1954 will reduce demands against California crude by an estimated 35,000 bbl. daily in the British Columbia market, but Canadian crude will not be competitively available to California refiners under existing price ceilings. Venezuelan, Middle East, and Gulf Coast crudes are even less competitive, precluding increased imports from those and other sources.

Supply and demand . . . Under present conditions West Coast production, 981,000 bbl. daily in 1952, will be only 1,000,000 bbl. daily in 1954, PAD estimated. With natural gasoline and other raw materials and imports from other areas, total supply will increase from 1,105,000 bbl. daily last year (not including the 37,000 bbl. imported at excessive cost) to 1,124,000 bbl. in 1954.

Against this, however, total demand will increase from 1,148,000 to something over 1,169,000 bbl. daily and the shortage, which was 43,000 bbl. last year, will range from 45,000 to 63,000 bbl. daily in 1954, depending on the export and intercoastal movement and military demand.

"We believe that the national security and our mobilization effort would be advanced by increasing indigenous production on the West Coast and by utilizing the existing spare refining capacity," PAD declared.

Capacity last January 1 was 1,173,000 bbl. daily and crude runs are expected to average 994,000 bbl. daily this year. There will be an increase in capacity to 1,219,000 bbl. daily next year, but runs are expected to drop to 975,000 bbl. a day. In 1954, when capacity will reach 1,246,000 bbl., runs are foreseen as advancing only to 995,000 bbl.

Separate problem . . . "In our opinion, a price increase for California crude oil and for its products would not, in itself, create, or tend to create, a shortage or a need for an increase in prices in any other geographical locality, and will, to the extent that it stimulates additional production, effectuate the purpose of the Defense Production Act of 1950," PAD commented. "In the absence of major distortions in the supply and distribution patterns of the petroleum industry, California crude oil prices can be expected, normally, to rise or fall according to West Coast supply and demand, largely independent of such factors in other areas of the United States.

"It is our conclusion that existing crude oil prices on the West Coast adversely affect its crude-oil productive capacity and the supply of products in that area. We believe that the present shortages of West Coast crude oil and products would be relieved if their current prices should be decontrolled or increased sufficiently to encourage additional indigenous production and the competitive and economic importation of crude and products from other areas."

New Unit Near Completion

LOS ANGELES.—A new $10,000,000 benzene unit is rapidly nearing completion at the El Segundo refinery, near Los Angeles, of Standard Oil Co. of California.

The first two sections of the new plant, a 12,000-bbl. Platformer and a gasoline-fractionating unit already are on stream. The benzene-recovery unit, the last section, now is being prepared for final tests.

A substantial portion of the output of the El Segundo unit will be used as feed stock for a new $4,000,000 phenol plant now under construction at Standard's Richmond refinery. Output of the new El Segundo unit will be approximately 850 bbl. of benzene and 3,200 bbl. of toluene daily.

Old Plant to Be Dismantled

LOS ANGELES.—Last of the gas manufacturing facilities which at one time supplied the Los Angeles area with more than 100,000 M.c.f. daily will be dismantled in the next few months.

The mile-long, $30,000,000 plant was placed on a standby basis in 1928, when Southern California Gas Co. changed its supply from manufactured to natural gas. In 1943 a portion of the plant was converted to production of butadiene, at a cost of $12,000,000, but these facilities have been inactive since 1947. Southern California Gas will continue to operate gas compression and storage facilities on the property.

Line Plans Talked

Participation of California Standard in big line sought

SAN FRANCISCO. — Negotiations were in progress here last week regarding the participation of Standard Oil Co. of California in plans of West Coast Pipe Line Co. to build a major crude-oil line from West Texas to California.

There was no announcement of results of the conferences between L. M. Glasco, West Coast president, and officials of Standard of California.

In Dallas, Burt E. Hull, West Coast vice president and director, said any crude-oil purchase commitment by Standard of California would be expected to lead to commitments by other California refining interests which, combined, would assure sufficient throughput to satisfy the requirements of debenture financing.

Without sufficient assurance of refinery commitments for receiving West Texas crude from the proposed line, the debenture financing would be delayed.

Hull said the crude-supply situation in California is favorable to the economic prospects of a line from Texas. Not only is 100,000 bbl. daily coming to California from overseas, but more than 80,000 bbl. daily of refined products is moving through the Panama Canal for the military services which the Government would prefer to buy in California if sufficient crude were available, he said.

Pipe for West Coast's 960-mile, 24-in. line is now scheduled for delivery in 1953, pending completion of financing plans. The line would run from Snyder, Tex., to Norwalk, Calif.

Plans for New Plant Dropped

LOS ANGELES.—Union Oil Co. of California temporarily at least, has dropped any plans for a refinery in the Puget Sound area.

The company held an option to buy 1,000 acres on tidewater near Mukilteo, Wash., about 20 miles north of Seattle, as a potential refinery site.

On December 2 the company announced the option on the acreage had been allowed to expire.

L.P.C. Storage Plan Studied

LOS ANGELES. — Tests conducted during recent months indicate the horizon selected by Standard Oil Co. of California near its El Segundo refinery will make a successful storage reservoir for liquefied petroleum gases. The project is believed to be the first such underground storage program under way in California.

A 3,400-ft. water-bearing sand was selected for the project. Propane injected into the porous sand displaced the water down-structure and later was withdrawn at high rates, suggesting that the project will be a commercial success.

TECHNOLOGY

New Acidizing Method

Use of liner cemented in hole makes possible acidizing of isolated sections; field tests scheduled in Canada

NEW YORK. — A new development in selective acidizing is now ready for its initial application in three wells nearing completion in the Del Bonita-Blood Indian trend of southern Alberta.

General details of the method were first revealed here by Eugene L. Davis, projects manager for National Petroleum Corp., Ltd., a producing company with properties in western Canada.

Using a specially designed liner which is cemented in the hole, acid can be introduced directly to isolated zones in a producing formation through telescoping tubes which extend from the liner to the formation face. The method will eliminate perforating, thus ruling out the possibility of shattering the cement bond with either liner or formation and the resulting migration of acid up or down the hole to more permeable zones, Davis said.

He estimates that the ability to put the acid into the tighter zones in Del Bonita wells, for example, would increase their production four to five times. He also anticipates that the technique should show similar results in opening up the tighter oil-saturated strata in wells of the Permian, Anadarko, and Williston basins.

The new device has undergone thorough laboratory tests, and about 200 of the liner tubes have been made for the field tests. Three wells on National Petroleum properties are now drilled to the Madison lime and will be completed with the new type liners, possibly within the next few weeks, according to the following procedure.

Procedure . . . Casing will be set at the top of the Madison pay and the formation will be drilled in with oil. The liner will then be run to bottom on the tubing string.

The liner consists of standard 4½-in. pipe in which holes have been drilled and tapped in a spiral pattern at intervals giving about three or four holes per linear foot. Two-stage telescoped, ⅝-in. i.d. tube assemblies are screwed into these holes from the outside, with their exterior faces flush with the liner guards.

When the liner has been run to desired depth, hydraulic pressure will be applied against a bottom valve. A pressure of 400 psi. will force the tube assemblies outward against the face of the formation, where they will open and lock in place when pressure is released. Each tube is faced with a Neoprene rubber washer to form a tight seal against the wall of the hole. The liner will then be cemented with plastic, using the two-plug method.

As a further precaution against disturbing the tight bond obtained with the plastic cement job, the tubing will be released from the liner by chemical solvent action, thus eliminating the shock of backing off. The well will then be ready for selective acidizing. This will be done using a tubing string with a bottom plug, and a perforated section flanked top and bottom by opposed swab cups. By successively raising the string, any selected zones in the formation can be isolated for acid injection through the liner tubes located opposite the perforated tubing section.

Development . . . The inventor of this device is S. Myron Zandmer who is president of National Petroleum, with headquarters in Calgary. General Hydrocarbons, Inc., a Toronto firm, financed its research and development, and holds exclusive Canadian rights to the method. National Petroleum has been granted free use in Canada. Claims have been allowed for the patents on the practice, but no negotiations have yet been opened for licensing it outside Canada. Those engaged in its development wish first to obtain satisfactory field results.

Davis, who was formerly projects manager for Arctic Contractors at the U. S. Navy's Petroleum Reserve No. 4 in Alaska, has had prior experience as production superintendent for Signal Oil & Gas Co. and as director of production in District 5 during the war. He visualizes other uses for the new liner, including potential application in controlled water flooding and selective employment of the Hydrafrac method.

Line Pipe Allocated

U. S. Pipe Line and West Coast Pipe Line given more than half of first-quarter allotment of 234,353 tons of steel

WASHINGTON.—The allocation of 234,353 tons of line pipe for first-quarter 1953 use, 222,896 tons of it going to six large crude and eight large products pipe lines, was announced last week by the Petroleum Administration for Defense.

The crude pipe lines, which will cost an estimated $206,226,000, will require a total of 514,563 tons of pipe for construction, of which 126,269 tons will be made available in the coming quarter. The products lines, to cost $189,472,000, will require 396,233 tons of pipe of which 96,627 tons is being made available.

Allocations for small projects, terminals and maintenance, repair and operation totaled 11,457 tons.

New projects... Five projects were given allocations for the first time, as follows:

...Phillips Pipe Line Co. 45-mile 12-in. crude line from Missouri City to Sweeny, Tex., to cost $1,851,000, with an initial capacity of 35,000 bbl. daily, for completion in the third quarter of 1953, given 3,874 tons.

...Gulf Refining Co. 55-mile 10 and 12-in. crude line from Bay Marchand to Plaquemines, La., to cost $3,195,000, with an initial capacity of 50,000 bbl. daily, for completion in the second quarter, given 5,530 tons.

...Cal-Ore Pipe Line Co. 103-mile 6-in. products line from Crescent City, Calif., to Medford, Ore., to cost $2,272,000, with an initial capacity of 8,000 bbl. daily, for completion in the fourth quarter, given 4,725 tons.

...Phillips Pipe Line Co. 66-mile 10-in. products line from Brookshire to Sweeny, Tex., to cost $1,985,000, with an initial capacity of 25,000 bbl. daily, for completion in the third quarter, given 5,103 tons.

...Standard Oil Co. (Ind.) 243-mile 10 and 12-in. products line from Whiting, Ind., to River Rouge, Mich., to cost $11,544,700, with an initial capacity of 49,000 bbl. daily, for completion in the fourth quarter, given 123 tons.

An allocation of 45,064 tons also was made for the Lakehead Pipe Line Co. crude line from Superior, Wis., to the international boundary near Sarnia, Ont., to cost $60,000,000, with an initial capacity of 100,000 bbl. a day, for completion in the fourth quarter. An initial allocation of 44,600 tons was made for fourth-quarter construction subsequent to the announcement of allotments for the period by PAD. *(See Canada.)*

Other projects... Other major projects given first-quarter allocations are as follows:

...West Texas Gulf Pipe Line Co. 587-mile 20 and 26-in. crude line from West Texas to the Gulf Coast, to cost $39,672,000, with an initial capacity of 301,000 bbl. daily, for completion in the first quarter, 966 tons.

...West Coast Pipe Line Co. 116-mile 26-in. and 844-mile 24-in. crude line from Wink, Tex., to Norwalk, Calif., to cost $101,128,000, with initial capacity of 200,000 bbl. daily, for completion first quarter 1954, given 70,000 tons. *(See West Coast.)*

...Service Pipe Line Co. 41-mile 4-6-8-in. crude line in Williams and Mountrail counties, North Dakota, to cost $380,000, for completion in the second quarter, 835 tons.

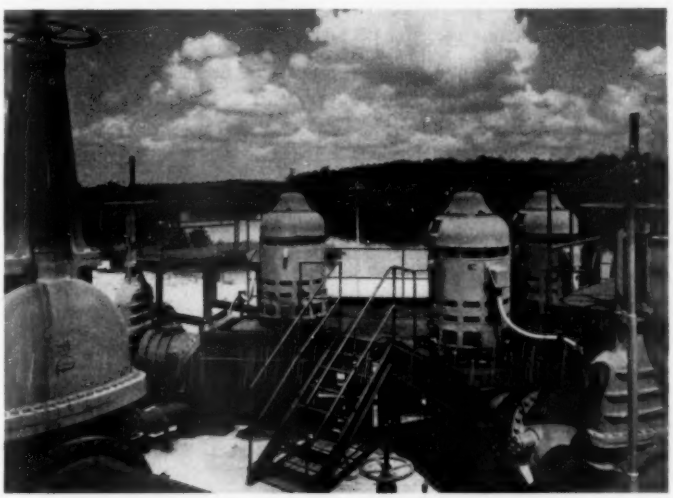
...Buckeye Pipe Line Co. 364-mile 8-10-14-16-in. products line from Linden, N. J., to northern New York points, to cost $24,000,000, initial capacity 80,000 bbl. daily, for completion first quarter 1954, given 15,816 tons.

...Phillips Petroleum Co. 50-mile 8-in. products line from Spraberry to Goldsmith, Tex., to cost $100,000, initial capacity 8,000 bbl. daily, for completion in first quarter, 309 tons.

...Bell Oil & Gas Co. 145-mile 6 and 8-in. products line from Ardmore to Drumright, Okla., to cost $3,271,396, initial capacity 9,000 bbl. daily, for completion second quarter, 9,006 tons.

...United States Pipe Line Co. products system, 550 miles of 24-in. from Port Neches, Tex., to Jackson, Tenn., 1,045 miles of 22-in. from Jackson to Newark, N. J., and 204 miles of feeder lines, to cost $141,091,000, initial capacity 300,000 bbl. daily, completion in first quarter 1954, given 60,000 tons.

...Indiana Farm Bureau 230-mile 4 and 8-in. products line from Mount Vernon to Peru, Ind., to cost $5,208,000, initial capacity 12,000 bbl. daily, for completion in second quarter, 1,545 tons.



Meeting a Chemical Plant's Water Requirements

An abundant supply of water is requisite for the processing plant. Cooling and process water requirements at Diamond Alkali Co.'s chemical plant on the Houston Ship Channel are pumped to the plant from nearby sources by these three pumps, each driven by 300-hp. motor. The pumps can deliver 60,000,000 gal. of water per day.

Pipe Decontrol Talked

Some independents want it, but PAD is fearful; oil-trade groups asked to discuss problem this week in Washington

WASHINGTON. — Suggestions for decontrol of oil-country tubular goods may be laid before the Petroleum Administration for Defense this week by independent producers.

Representatives of a large number of oil-trade associations were invited by PAD to come in December 8 to discuss the desirability and feasibility of eliminating the allocation system.

A desire on the part of some small independent operators to get rid of the controls has been evidenced in correspondence reaching Washington and in discussions in the industry. One association polled its membership and it is understood that early returns were heavily in favor of decontrol

PAD officials believe it would be seriously unwise to eliminate allocations now or in the immediately foreseeable future. Production Director Robert L. Foree last week told the New Mexico Oil and Gas Association that all prospects as far ahead as the end of 1954 are that the increase in tubular goods production will be insufficient to keep pace with increasing requirements and the industry will be several hundred thousand tons short each year of the tubular goods it could use in its normal expansion and mobilization programs.

Exports a danger . . . It was pointed out in Washington that decontrol not only means that operators will have to scramble for tubular goods but that all restrictions on exports will be lifted.

It is believed an immediate speedup of foreign development would result. Venezuela, for instance, is far behind in a drilling program that would keep production up; Canada could use large quantities of steels in developing fields now being outlined, and political considerations might demand accelerated drilling in the Middle East.

Drilling forecast . . . PAD officials estimated that about 46,200 wells will be drilled this year with a total requirement for casing and tubing of 2,158,000 tons. Against this, it is figured that mill shipments will be about 1,590,000 tons of which 330,000 tons will be for other purposes, leaving a net for drilling of 1,260,000 tons, including about 100,000 tons of conversion steel.

One mill recently closed and will not reopen until 1954. Next year, 3 new mills are to come into operation and will produce an aggregate of something over 200,000 tons of casing and tubing.

Drilling next year is expected to run in the neighborhood of 48,000 wells and reach about 50,000 wells in 1954. The average depth of wells and consequent steel requirement is climbing yearly, and 1954 tubular goods demand is seen as running at about 2,133,000 tons with domestic tubular goods production about 378,000 tons less.

Product Exports Climb

WASHINGTON.—Exports of major products jumped to an average of 270,000 bbl. daily during the week ended November 7 from 176,800 bbl. daily in the preceding week, according to statistics compiled by the Petroleum Administration for Defense.

Shipments increased in all categories, with distillate again topping the 100,000-bbl. a day mark and motor gasoline, kerosine, and residual double the movement for the week ended October 31.

Details of the week's exports, compared with the preceding week, and the averages for the 4 weeks ended November 7, are shown in the accompanying table, in thousands of barrels daily.

	Week ended		Average
	Nov. 7	Oct. 31	4 weeks
Aviation gasoline	41.1	35.2	34.0
Motor gasoline	72.7	35.4	44.5
Kerosine	14.2	4.0	9.7
Distillate	106.0	83.7	103.6
Residual	36.1	18.5	42.5
Total	270.1	176.8	234.3

Higher L.P.G. Ceiling Asked

WASHINGTON. — Higher ceilings on certain sales of liquefied petroleum gas were urged upon the Office of Price Stabilization last week by members of its L.P.G. Industry Advisory Committee.

The committee discussed a proposal that gas sold from remote storage be granted an additional half-cent above the 2-cent differential already provided for gas sold from underground storage located adjacent to producing plants.

The suggestion was advanced by producer members of the committee but met with opposition from distributor members.

A suggestion also was laid before OPS officials for an over-all price increase because of increased costs in making, moving, and selling L.P.G.

PAD's Biggest Chores

Military must get all the oil it needs; industry must get materials to produce it; East must get enough distillate

Bertram F. Linz

WASHINGTON.—The Petroleum Administration for Defense currently is faced with only three major problems. Two of them are long-range problems, the third a seasonal one—that of assuring an adequate supply of middle distillates to meet the winter demand on the East Coast.

In a recent report to the joint congressional committee on defense production, PAD said its big jobs now are those of industry expansion and military supply. These involve:

. . . Assuring sufficient materials, particularly steel, to permit fulfillment of the essential expansion goals for the oil and gas industries and distributing the goods in accordance with the demands of defense and of equity among operators.

. . . Assuring adequate supplies of petroleum products — especially aviation gasoline, diesel fuel, jet fuel, and Navy special fuel, which continue to be in tight supply—to satisfy the needs of the military. The armed services purchased approximately 150,000,000 bbl. of products at home and abroad in the fiscal year 1952 and will buy around 200,000,000 bbl. this fiscal year.

Other functions . . . But the fact there are only three problems to bother it currently doesn't mean that PAD hasn't anything else to do. As a matter of record, it has 15 continuing programs, all designed to insure an adequate continuing supply of oil and gas, which can be briefly summarized as follows:

1. Forecasting of Free World demands for crude and products under conditions of (a) mobilization and (b) possible all-out war.

2. Determination of supplies of crude available by areas in the United States and in other countries this side of the Iron Curtain.

3. Determination of the usable capacity by areas for refining crude within the United States and by countries throughout the Free World.

4. Determination of the usable capacity of all facilities commonly used in

transporting crude and products—pipe lines, tank cars, tank trucks, barges, and tankers.

5. Determination of what expansion, if any, is needed in production, refining, and transportation to meet the forecast demands.

6. Forecasting of demands for natural, manufactured, and mixed gas under conditions of (a) mobilization and (b) possible all-out war.

7. Determination of available supplies of natural gas by areas in the producing fields.

8. Determination of the potential capacity for production of manufactured gas.

9. Determination of the transmission capacity of natural-gas-gathering systems, trunk pipe lines, and distribution systems.

10. Determination of what expansion, if any, is needed in production or transportation to meet the forecast demands for gas.

11. Determination of the capacity of those supporting industries that contribute all or most of their output to the oil and gas industries—manufacture of oil-field equipment, certain refining catalysts, and tetraethyl lead, for instance—and of any expansion of those industries necessary to meet forecast demands.

12. Determination of the amount of materials needed in the oil and gas industries and closely related industries to maintain current capacity and to provide needed expansion.

13. Presentation before the Defense Production Administration and National Production Authority of the claims for these materials.

14. Distribution of the materials allotted by DPA among the various operating units of the industries, giving due priority to projects most urgently needed in the defense-mobilization program.

15. Determination of the extent to which incentives for expansion of capacity—for example, necessity certificates for accelerated tax amortization or defense loans—are required for each of the industries involved.

NPC to Meet

Storage, fuel-oil briefing due at final 1952 meeting

WASHINGTON. — Reports on the Bunker C fuel oil situation and aboveground petroleum storage capacity are scheduled to be submitted to the National Petroleum Council at its final 1952 meeting December 9.

The bunker-oil report will be submitted by B. Brewster Jennings, president of Socony-Vacuum Oil Co., Inc.,

WATCHING WASHINGTON

Bertram F. Linz

What's the Policy?

The U. S. Chamber of Commerce wants the new Republican administration to adopt a consistent policy on foreign oil development "so that American enterprises will not alternately be encouraged to venture abroad and then harassed for having done so."

The chamber's views were embodied in a new statement of policy actuated by the government's cartel attack which has had the effect of encouraging nationalistic aims in several foreign countries and are being used to stir up trouble.

Without passing on the merits of the case, the chamber's board asserted this country needs a national policy on foreign oil which gives due regard to our national security and to the problems of risk, geographical concentration, and size of operations which affect and condition investments abroad.

It should be the policy and practice of the Government to consistently foster private enterprise in foreign oil operations and to give the necessary and appropriate diplomatic support to its nationals engaged in foreign oil operations.

The chamber policy warned, however, that foreign oil development should be left in the hands of private investors and the Government itself "should refrain from entering directly or indirectly into the oil business or financing international investment in this field."

Ike and the "Cartel"

If the incoming Eisenhower administration wants to evidence a more friendly attitude toward business a good first place to do it will be in the dropping of the "international oil cartel" case.

Observers in Washington believe that the new attorney general, Herbert E. Brownell, will try to call off the present administration's fishing expedition, which can actually get under way, at the earliest, only a few days before the change in government.

How to do this without being accused of rank outright politics is the problem to be solved. Possibly the best way would be for the Department of Justice to kill the grand jury investigation and announce that less cumbersome cases would be filed—the way the department got out of the embarrassing Mother Hubbard suit which threatened to drag on to eternity.

The department could make a weak presentation to the grand jury after going through whatever preliminary motions may remain so that the jury would not return an indictment, but that might be an undesirable way politically. Or, if the Supreme Court agrees to hear the companies' appeal from the refusal of the lower courts to kill the investigation it might get a reversal which would end the matter.

All this is purely in the realm of speculation, of course. The new department officials might see merit in the case and go ahead with it full blast. And that's pure speculation, too.

Turn From Coal

Within a decade the use of oil as a fuel for ships on the Great Lakes has increased from practically nothing to around 25,000 bbl. a week.

That is a rather remarkable trend in view of the fact that coal is one of the three major commodities moving along the lakes (ore and wheat are the other big loads) and the considerably higher cost of oil.

The shift from coal to oil, however, is based flatly on economic reasons. Quicker fueling, better turn-around, savings in labor, cleanliness, additional cargo space, flexibility, and efficiency, all add up to offset the 20 per cent higher cost of marine bunker oil.

So far, the use of oil as fuel is more or less experimental and its spread will depend on the future relative cost of coal and the availability of supply from the Canadian oil fields.

The experience of ship owners, however, indicates that the use of heavy boiler oils in diesel engines may become entirely practical, in which case the motorship may be economical even if oil-fired steamers cease to compete with coal-burning vessels, according to the Lake Carriers' Association.

and chairman of a committee which has been studying the subject since last May. It will summarize trends in domestic manufacturing, imports and usage since 1946, and the technological changes and other probable reasons leading in recent years to a decline in the proportionate output of the fuel in relation to crude runs.

The investigation of aboveground storage capacity, conducted by a committee headed by L. S. Wescoat, president of Pure Oil Co., will bring up to date a report made by the NPC in October 1950.

The council also will receive progress reports on the use of radio and radar by the industry and on the oil and gas prospects of the submerged offshore lands.

Several requests for additional studies are expected to be submitted to NPC by the Interior Department for consideration at the meeting.

On the eve of the meeting, the council will hold a formal dinner in honor of Interior Secretary Oscar L. Chapman, who is scheduled to be succeeded by Gov. Douglas McKay of Oregon next month.

Oil Case Resumed

Government renews probe of "international cartel"

WASHINGTON. — Activity in the government's "oil cartel" investigation will be renewed this week.

December 8 is the deadline set by District Court Judge James R. Kirkland for submission of proof by the companies that other governments object to the disclosure of contracts and other vital records involving their nationals.

On the same day, the Supreme Court will reconvene following its regular month-end recess and may announce whether it will review the lower court decisions refusing to dismiss the District of Columbia grand jury or transfer the investigation to another jurisdiction.

Resistance encountered . . . The British Government already has made known its refusal to allow Anglo-Iranian Oil Co. to produce documents demanded by the Department of Justice.

The decision was announced to the House of Commons last month by Geoffrey Lloyd, minister of fuel and power, who said it was "contrary to international comity" that British companies should be required to produce documents in the United States which do not even relate to business in this country and that such disclosure might prejudice or endanger the economic, strategic, and political interests of both Britain and the western allies.

The government of India also has put itself on record as opposed to the department's demands, warning Standard-Vacuum Oil Co. that records relating to the sale of oil in India, and especially to its military forces, cannot be disclosed without authorization.

Appeal from the refusal of Judge Kirkland, upheld by the appeals court, to quash the investigation or transfer it to New York was filed with the Supreme Court October 29 by California-Texas Oil Co., Socony-Vacuum Oil Co., Inc., Standard Oil Co. of California, The Texas Co., and Arabian American Oil Co.

Pipe-Line Suit Filed

Guaranteed-tender contract proposed by U.S. Pipe Line subject of federal court action by four barge operators

WASHINGTON.—Plans of the United States Pipe Line Co. to operate its proposed Texas-New Jersey products line on a "guaranteed tender contract" basis were attacked in the courts last week.

A suit to enjoin the company from executing guaranteed tender contracts was filed in the federal District Court for the Southern District of New York December 2 by four barge operators: River Co. and Chotin Towing Corp., New Orleans; Commercial Petroleum & Transport Co., Houston; and Greenville Towing Co., Greenville, Miss.

The pipe-line company's proposed method of operation was given the approval of the Department of Justice last month *(The Oil and Gas Journal, November 17, page 249)* and the department refused to reverse its position on appeal by the barge interests. The department's "clearance" was merely assurance against criminal prosecution under the antitrust laws in respect to the use of the tender contract.

Essence of complaint . . . In their complaint, the barge operators charged the pipe-line company with acting in restraint of trade and in violation of the Sherman Act in proposing long-term exclusionary contracts, by organizing a combination among shippers entering into contracts, and by linking those plans with a structure of rate and minimum-tender provisions discriminating against the smaller independent refiners and marketers.

The operators told the court their complaint does not attack the construction of a pipe line as in itself unlawful or complain of the competition it would provide, but that they do complain of the necessary effect upon their competitive opportunities of the defendant's plan for establishing and operating the proposed pipe line, and of the defendant's purposes and methods in carrying out its plan.

"With continuing improvements in barge operations, including recent developments in the industry, and with the inherent advantages of water transportation, plaintiffs and the other barge operators can meet the competition of defendant's proposed pipe line if free and open competition is maintained, but defendant's plan, purposes and methods are in restraint of and destructive to competition and in violation of the antitrust laws," it was declared.

Clearance opposed . . . While they have appealed to the courts, attorneys for the barge operators declared they would continue their efforts to obtain reconsideration by the Department of Justice of its clearance. They pointed out that while the department said it would forego criminal proceedings, it expressly reserved the right to bring civil proceedings under the antitrust laws and specifically declined to consider whether the plan violated the Interstate Commerce Act.

Research Methods Analyzed

WASHINGTON.—Policy questions connected with the recommendations of the President's Materials Policy (Paley) Commission for development of our mineral resources were discussed November 29 at the first meeting of a panel of specialists in geology, mining, and geophysics established to advise the National Science Foundation.

In its report, the Paley Commission recommended an intensive program of basic scientific research and technical development, and the panel has been asked to consider the need for an inventory of current research in exploration techniques and the formation of a committee to make such an inventory.

Serving on the panel, composed of industry, educational and government representatives, are John G. Bartram, consulting geologist of Stanolind Oil & Gas Co., Tulsa, and Paul D. Foote, executive vice president of Gulf Research & Development Co., Pittsburgh.

Conversion Goods Allocated

WASHINGTON.—Individual allotments of 35,136 tons of conversion casing and tubing have been granted to 189 oil and gas operators for the first quarter of 1953 by the Petroleum Administration for Defense.

Possibilities of further allotments were raised by PAD, which said that if additional conversion space becomes available at steel mills it will be passed on to operators whose applications are already on file.

In distributing the conversion supplies, 8,078 tons was allotted to 142 "A" operators who normally drill not more than 40 wells a year and 27,058 tons went to 47 of the larger "B" operators.

Previously, PAD allocated 260,288 tons of tubular goods in primary allotments and 218,569 tons in secondary allotments.

GULF COAST

Rising Process Center

Texas' Golden Triangle emerging as one of world's most important, most concentrated refining and petrochem areas

F. Lawrence Resen

ORANGE, Tex.—Announcement by Goodrich-Gulf Chemicals, Inc., that it will build a multimillion-dollar petrochemicals plant here has turned the spotlight on a rapidly developing and increasingly important area — Texas' Golden Triangle.

Here in an area of little more than 300 sq. miles is being concentrated a refining and petrochemical center involving six refineries, the world's largest butadiene plant, six other petrochemical plants, and several sulfur plants operated in connection with the refineries.

The rapid rise in importance of this Orange-Beaumont-Port Arthur triangle is understandable. It is close to both raw materials and water transportation. Its processing plants have a bountiful supply of cooling water in the Sabine River and the Gulf of Mexico.

As the plants grew in number, there arose an interdependence among them which has hastened the development of the area. In one such case, five companies feed butane products into the Neches Butane Co. plant at Port Neches, which returns the unused portions of the butane streams for refinery processing. Installation of a pipe-line system which handles liquefied petroleum gases also has contributed to the area's development.

New projects . . . The Goodrich-Gulf company plans construction on a 701-acre site on the Sabine River of a plant which is expected to use ethylene from the Gulf Oil Corp. plant now nearing completion at Port Arthur *(The Oil and Gas Journal, November 24, page 159)*. Size of the plant or its products have not been disclosed.

Nearby Allied Chemical & Dye Corp.'s Solvay Process Division has just

begun construction on a $5,000,000 petrochemical plant which will produce principally ethylene oxide and ethylene glycol. It is anticipated that the plant eventually may be expanded considerably. Contractor on the plant is Austin Co.

At the Port Arthur corner of the Golden Triangle one new petrochemical plant is just going into operation and another is scheduled to be on stream by the end of December. Koppers Co. is just placing in operation its new ethylbenzene plant, which produces the intermediate chemical for further processing in its Kobuta, Pa., plant. Gulf Oil Corp. expects to have its mammoth ethylene plant in operation by the end of the new year. This plant will produce 180,000,000 lb. of ethylene annually which will be fed to petrochemical plants along the Gulf Coast through a special ethylene pipe line. In addition, Gulf is placing in operation an iso-octyl alcohol plant with a capacity of 9,000,000 lb. per year.

Another important petrochemical plant is the Sabine River Works of E. I. du Pont de Nemours & Co., Inc., at Orange. Using natural gas as a raw material, the plant manufactures nylon salt, polyethylene, and methanol. Du-Pont has obtained also an option on a plant site in Beaumont for possible construction of an additional plant not yet specified.

Over-all picture . . . The degree of concentration within the Golden Triangle could readily be seen by an aerial observer midway between Beaumont and Port Arthur.

From such a position he would be able to see six refineries having a combined crude-oil charge capacity equal to more than one-tenth of the total capacity of the United States, and including catalytic and thermal cracking facilities exceeding 12 per cent of the nation's total.

These six plants, with an aggregate crude capacity of 770,000 bbl. per day, are those of Atlantic Refining Co., Gulf Oil Corp., and The Texas Co. at Port Arthur; Magnolia Petroleum Co. at Beaumont; Pure Oil Co. at Nederland; and The Texas Co. asphalt plant at Port Neches. Cracking capacity of this group totals 543,000 bbl. daily, including 261,000 bbl. in catalytic facilities and 282,000 bbl. of thermal.

Also in view of the observer would be the world's largest butadiene plant, that of Neches Butane Products Co. at Port Neches. The butadiene, manufactured from butane streams from five of the triangle's six refineries, is used in the production of Buna-S rubber in the two nearby rubber plants of B. F. Goodrich Co. and U. S. Rubber Co.

Also located at Port Neches is the plant of Jefferson Chemical Co., which manufactures ethanolamines, ethylene glycol, and other ethylene derivatives from refinery gases supplied by The Texas Co.'s Port Arthur refinery.

Expansion, too . . . Growth of the triangle's industry cannot be measured alone by the announcements of new plants.

Within existing plant sites a vigorous expansion program has been under way since the war. Illustrative of this expansion is the erection of three cat crackers at the Magnolia refinery, where a new reforming unit also is scheduled for construction. Gulf completed a 63,000-bbl. fluid unit in the postwar period; Pure is planning additional cracking facilities; and Atlantic is planning construction of a large cat reforming unit. New facilities also were added recently by Jefferson Chemical, Neches Butane, and Du Pont.

These expansion programs, together with plans for new processing plants, point to the continued development of the Golden Triangle as one of the most valuable and most concentrated processing centers of the world.

Uranium Hunt Proposed

Geological societies join in plan under which petroleum industry would seek scarce uranium in normal operations

LOS ANGELES.—The petroleum industry may give the nation a big boost in its border-to-border hunt for scarce uranium, atomic energy's raw material.

Under a plan developed by the three principal geological societies, the industry would combine uranium hunting with its normal oil-exploration activities, with the small added expense considered justified by the possibilities of worthwhile profits.

The five-point plan was outlined here last week by Curtis H. Johnson, president of the Society of Exploration Geophysicists. It is sponsored jointly by the American Association of Petroleum Geologists and the Society of Economic Paleontologists.

The plan involves five steps which oil companies are being asked to follow to discover the needed uranium:

... **Checking material** excavated from shallow test holes for radioactivity. The principal obstacle to finding uranium and thorium is the limited range of detection instruments, and 6 in. of earth on top of a uranium deposit cuts the chances of its ever being discovered in half.

If there is 4 ft. of earth over it, Johnson said, there is only one thousandth the chance of finding it.

Since the oil industry drills more than 4,000 shallow holes each day in the United States and Canada, checking of the excavated material by follow-up crews would mean the study of thousands of square miles of land a day at virtually no cost, Johnson said. "Surface prospecting just can't do the job," he added.

... **Checking for radioactivity** in all material drilled out in the first 500 ft. in each of the nearly 1,000 oil wells drilled by the industry each week.

... **Encouraging surface geologists** of oil companies to be alert for the clues of radioactive deposits. Oil companies would be urged to equip these geologists with detection devices which they would use on their oil-hunting trips, often on foot in remote and barely accessible areas.

... **Running a gamma ray log** to check the first 500 ft. of drilling, a step seldom taken because the first 500 ft. ordinarily is of little interest.

... **Alerting all oil-industry** engineers and technical people handling gamma ray logs to watch for evidence of unusually high radioactive materials. This part of the plan has already been put into action.

Johnson said the committee is recommending that these activities be carried on by all oil operators as a business proposition in the hope of making a profit.

The committee, he said, is pointing out to all oil operators that at a small additional cash expense, plus some time expenditure by scientific employes, it is possible they might discover important deposits of radioactive materials, badly needed for national security and at the same time profitable.

The committee . . . Known as the Advisory Committee on Radioactive Mineral Exploration, it is headed by Dr. Frederick H. Lahee, Sun Oil Co., Dallas, principal author of the plan. Vice chairman is Henry C. Cortes, Magnolia Petroleum Co., Dallas.

Other members of the committee are John Emery Adams, Standard Oil Co. of Texas, Midland, Tex.; Cecil H. Green, Geophysical Service, Inc., Dallas; Gerhard Herzog, The Texas Co., Bellaire, Tex.; John G. Bartram, Stanolind Oil & Gas Co., Tulsa; A. I. Levorsen, consultant, Tulsa; Gerald H. Westby, Seismograph Service Corp., Tulsa; Dr. Sigmund Hammer, Gulf Research & Development Co., Pittsburgh; Morton T. Higgs, Lane-Wells Co., Los Angeles; J. Harlan Johnson, Colorado School of Mines, Golden, Colo.; and Clarence L. Moody, Ohio Oil Co., Shreveport.

Broadcasting Refinery Plans

A Voice of America broadcast from the offices of California Texas Oil Co., Ltd., in New York is shown being made by W. F. Bramstedt, left, Caltex president, and Jose P. Roxas, advertising and sales promotion manager for Caltex (Philippines), Inc. Subject of the broadcast was the $30,000,000 refinery being built by Caltex in the Philippines. The refinery, scheduled for completion in 1954, will have a crude-charging capacity of 13,000 bbl. daily and catalytic cracking capacity of 5,400 bbl. daily.

Industry Briefs

SHREVEPORT.—Gulf Refining Co. has moved its offices from the National Bank Building here to the new Texas Eastern Gas Transmission Building. The company's Shreveport office supervises Gulf Refining's activities in Louisiana, Arkansas, Mississippi, and Alabama.

DALLAS.—Maracaibo Oil Exploration Co. has sold its gas-producing properties in La Gloria field of South Texas for $250,000 cash. Maracaibo is an independent company with principal interests in the Lake Maracaibo area of Venezuela and other holdings in the Mid-Continent. Purchaser of the La Gloria holdings was not announced by the company.

OKLAHOMA CITY.—A 160-acre well spacing for the second Wilcox sand zone in Canadian County's new El Reno field was approved last week by W. H. Sellers, trial examiner for the Corporation Commission. The sand produces gas and distillate and lies at a depth of 10,304 to 10,610 ft.

Shifts in Chemicals

Growth of petrochem industry in Midwest and along Gulf is pushing the chemical industry's center south and west

NEW YORK.—A recent study of the chemical industry's expansion program reveals that projects based on petroleum and natural gas as raw materials are rapidly moving the center of the industry southward and westward.

The study was undertaken by the Manufacturing Chemists' Association, Inc. which met here November 25 for its second semi-annual conference.

While all sections of the country have participated in the tremendous growth of the industry over the past 2 years, a majority of the new chemical plants have gone up in the south, particularly in the states bordering the Gulf of Mexico, and in the Middle East.

The M.C.A. study is based largely on an analysis of rapid-amortization certificates for 789 chemical and allied projects issued by the Defense Production Administration through October 15. Many other expansion projects are going forward without these certificates and conservative estimates place the expansion covered by fast writeoffs at less than 70 per cent of the industry's total.

Still expanding . . . The industry is approaching the halfway point in a $6 billion expansion program for the 5 years 1951-1955. This will increase the size of the 1950 industry by roughly one-third and is added to a $3.5 billion wartime expansion and a postwar program costing about $5 billion.

Necessity certificates have been issued for projects in 45 states. The region comprising Texas, Louisiana, Oklahoma, and Arkansas accounts for $706,344,000 in new plants, almost twice the $372,888,000 allotted to new plants in the east-north-central states of Ohio, Indiana, Illinois, Michigan, and Wisconsin. The Middle Atlantic region, traditionally the leading chemical producing area of the country, ranks fourth in new facilities for the period studied.

"The principal reason for the large concentration of new chemical activity in the Southwest," said William H. Ward, of E. I. du Pont de Nemours & Co., Inc., chairman of M.C.A. "has been the combination of readily available raw materials, particularly petroleum and natural gas, plus low-cost water transportation to eastern markets. Most of the expansion in the area has been in ammonia, a basic ingredient of synthetic fertilizers and explosives, and in plastics and synthetic fibers, all from petroleum and natural gas. Much of the middle western expansion has also been in petrochemicals, partly based on local gas fields and partly on gas brought in from the Southwest by pipe line."

Purchase Offer Withdrawn

FORT WORTH.—Southern Production Co. has withdrawn its offer to purchase all of the assets of Texas Pacific Coal & Oil Co.

The announcement was made following a meeting of Texas Pacific directors here. The announcement said it was mutually agreed by C. T. Chenery, Southern Production president, and Texas Pacific directors that the offer would not be approved by owners of the necessary 80 per cent of Texas Pacific stock.

Late in November Southern Production announced it had offered $80,000,000 for all Texas Pacific assets (*The Oil and Gas Journal, November 24, page 76*).

Pollution Musts

Industry must take the lead, A.S.M.E. symposium is told

NEW YORK.—Industry should not wait for restrictive air-pollution legislation to be forced upon it; it should acquire special knowledge enabling it to take the lead.

Any workable legislation must provide for the utilization of technical knowledge and must encourage industry to assume the real responsibility.

This view of a major problem facing the petroleum industry was expressed here last week in an air-pollution symposium to the American Society of Mechanical Engineers by Frank L. Seamans, Pittsburgh attorney.

In addition, the A.S.M.E. was told by George F. Jenkins, of Carbide & Carbon Chemicals Co., industry's management and engineering talent should thoroughly acquaint the public with the problems involved and the steps being taken to solve them. Harmony between industry and surrounding communities is essential, and education of the public is needed to acquire it.

The symposium featured talks on many other aspects of the pollution problem, including its effect on com-

A.P.I. REFINERY REPORT, NOVEMBER 29
(Thousands of barrels)

District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, November 1951—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,069	404.1	38.0	265.1	226.6	29,812	14,452	41,859	12,172	1,022	402.5	46.9	279.8	232.3
Appalachian:														
District 1	114	47.9	7.9	18.6	14.3	3,947	550	1,795	732	103	44.1	5.6	16.4	14.1
District 2	94	48.1	7.9	15.6	13.0	1,612	308	652	317	78	34.1	7.0	9.6	17.8
Ind., Ill., Ky.	1,325	707.0	95.4	249.8	179.6	26,652	6,823	22,218	6,221	1,249	671.9	76.9	219.9	186.0
Okla., Kans., Mo.	590	329.3	18.0	150.1	54.6	12,659	1,996	13,431	1,724	508	285.1	17.5	116.7	65.1
Inland Texas	245	184.9	10.9	40.1	38.3	4,916	504	2,600	1,176	242	164.6	12.0	39.2	39.3
Texas Gulf Coast	1,796	831.0	136.4	466.9	277.7	19,301	3,592	14,837	7,887	1,570	727.6	139.0	347.0	252.3
La. Gulf Coast	555	282.3	71.0	137.0	61.0	6,528	2,591	5,074	1,724	530	232.8	74.3	109.8	59.9
N. La. and Ark.	83	33.3	7.4	18.9	6.8	2,856	607	943	249	80	34.0	7.7	16.9	7.3
Rocky Mountain:														
New Mexico	17	10.6		2.7	3.7	151		64	67	17	10.2	0.5	2.2	3.7
Other Rocky Mtn.	257	123.3	7.0	45.9	49.1	3,808	422	2,019	964	219	105.9	8.8	41.0	47.7
California	998	442.1	6.1	152.0	352.7	14,591	345	12,498	19,768	991	417.0	6.6	159.0	378.2
Nov. 29, 1952	7,143	3,443.9	406.0	1,562.7	1,277.4	126,833	32,190	117,990	53,001	6,609	3,129.8	402.8	1,357.5	1,303.7
Nov. 22, 1952	7,076	3,406.0	420.9	1,551.0	1,269.3	123,885	32,086	117,834	52,081					
Dec. 1, 1951	6,700	3,192.3	375.3	1,467.3	1,311.4	122,893	32,545	102,722	47,904					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.
(Since the A.P.I. report for November 22 was not available in time for last week's book, figures for that week are shown on page 174. The above data are from the current report.)

munity health, danger to plant life, necessity for study of climate and terrain in planning industrial plants, technical problems of sampling and measurement of air pollution, and the principles covering control equipment for dust collection and cleaning of stack gases.

For years the atmosphere was considered a natural means of waste disposal, but concentration of industry and increasing population have outlawed this practice, Bert S. Norling, of E. I. du Pont de Nemours & Co., Inc., said.

Installation of fly-ash collectors or other facilities constitute a costly burden on the plant operator, but even so, pollution abatement is a plant responsibility and good community relationship is the compensating return, he said.

A.S.M.E. Officers Installed

NEW YORK.—Dr. Emory N. Kemler, of the University of Minnesota, was installed as 1953 chairman of the Petroleum Division of the American Society of Mechanical Engineers executive committee here last week.

E. N. KEMLER

O. L. Lewis, of C. F. Braun & Co., Alhambra, Calif., was installed as secretary.

Other members of the executive committee are P. E. Frank, Sinclair Oil Corp., New York; M. A. Scheil, A. O. Smith Corp., Milwaukee; and A. H. Newberg, Service Pipe Line Co., Tulsa.

How to Use Engineers

Comprehensive report by N.S.P.E. shows industry is not using wisely the limited quantity of engineering talent

NEW YORK.—Industry in too many cases is wasting the talent of its too-few engineers by using them where they're not needed, the National Society of Professional Engineers declared last week.

This was N.S.P.E.'s essential conclusion after completing and analyzing results of a year-long study of how companies are meeting the current shortage of engineers.

During the survey, the society studied nearly 500 companies with about 106,000 engineers on their combined payrolls.

The group found that many engineers are being used in jobs that others could handle just as well. It recommended that industry could use its engineers more wisely by analyzing staff assignments and by standardizing and simplifying many routine engineering jobs so that they could be handled by assistants, thereby freeing engineers for more creative work.

The report on the survey, entitled "How to Improve the Utilization of Engineering Manpower," was prepared by the society's Professional Engineers Conference Board for Industry.

It reveals that the number of engineers as related to total employes in defense and supporting industries has doubled in little more than 10 years. The 1940 average was 1 engineer to 40 other employes. The current average is 1 to 20. This increasing demand for engineers is not linked to defense alone, the survey shows, but to all modern industrial, business, and scientific requirements.

Recommendation . . . Two check lists are established for placing engineers in jobs where their talents can best be utilized. One is designed to analyze the assignments of engineers within the companies, the other seeks to obtain suggestions from engineering personnel for assignments for assisting or supporting personnel.

Supporting personnel, the report suggests, could be drawn from that group of college students who do not complete engineering courses. This type of employe could take over many of the jobs which the survey found were now being done by engineers—such as drafting, market research, accounting, operation of experimental equipment, filing, and requisitioning.

Big turnover . . . Almost half of the companies surveyed reported having trouble maintaining enough engineers for efficient operation.

Such benefits as hospitalization and insurance seem to be losing some of their attraction. This, N.S.P.E. said, appears to be due to the fact that nearly all the larger companies now have these benefits.

Incentives appear more desirable than benefits, the survey showed. These include, in the order of their importance: Opportunity for advancement, stability of employment, chance to receive extra training, essential industry, and profit-sharing plan.

Other findings . . . In making engineers more effective, the report noted, centralization of top-level engineering and clear-cut delegation of authority and responsibility are extremely important.

Also, experience in several companies has shown that new engineers move into more complicated phases of engineering more rapidly and do better work if they are first subjected to a carefully planned indoctrination program.

SOUTHWEST

Optimism Voiced

Better atmosphere for oil ahead, N.M.O.G.A. told

ALBUQUERQUE, N. M.—The domestic oil man, though currently confronted with "mounting costs, stationary prices, and excessive imports," can view the future with optimism for the first time in many years.

Fairer treatment by government and an end to its periodical "whipping" of the industry was predicted here by Walter S. Hallanan, president of Plymouth Oil Co., at the annual meeting of the New Mexico Oil and Gas Association December 3.

"None of us is so immune to practical considerations as to think that any of the hard facts of our economy have been changed overnight. We have the same economic problems today that we had yesterday. But the atmosphere and the climate surrounding these facts and problems have been changed. We are no longer fumbling in the dark," Hallanan said.

At present, he said, the industry still is confronted with a completely unrealistic situation—trying to continue finding and producing oil priced the same as it was 5 years ago while contending with tremendously increased costs. Adding to the burden, he said, is the fact that the companies are finding less oil at the greater depths now being drilled than they formerly did at shallower levels.

Imports . . . A "seriously disturbing economic factor" in the price situation, he said, is that imports have more than doubled since the last price advance. "Up to a certain point, imports are wise and constructive; beyond that point, imports become progressively unwise and destructive." Facts and conditions, he said, indicate this dividing line has been crossed.

Hallanan's anxiety over the imports

Sailor Beware! The Old Man of The Sea!

WHO has not read of Sinbad, as told in the Arabian Nights by glamorous Scheherazade?

Shipwrecked on a strange island, the unfortunate sailor came upon a weak old man. Moved by compassion, Sinbad took the feeble fellow on his back, carried him over the brook, gathered fruit and fed him. But when Sinbad asked him to get down, the old man refused, wrapping his legs about his neck, almost strangling him.

The sailor fainted and fell down, yet the old man clung ever closer. He rained blows on Sinbad, driving him about without rest, to pick fruit and do his pleasure. This went on and on, until the desperate sailor made wine from wild grapes to appease his own plight. One day noting Sinbad's pleasure, the old man snatched a gourd of wine and gulped it down. Completely drunk, he loosened his grip and Sinbad threw him off. Saved by a passing ship, his rescuers said, "You are the first ever to escape strangling by the Old Man of the Sea".

Dating back hundreds of years, the Old Man is an allusion familiar to everyone. He is a warning figure today. Our nation, surviving the storms of two world wars, wanders down strange ways. With kindly intent and glorying in its own strength, America is tempted to shoulder the Old World and its age-worn problems. But weak and feeble as the Old World appears to be, let us beware! How easy to assume a burden which would quickly exhaust our strength, strangle us as a nation, and in the end leave the world as weak and exhausted as it was before our foolish undertaking!

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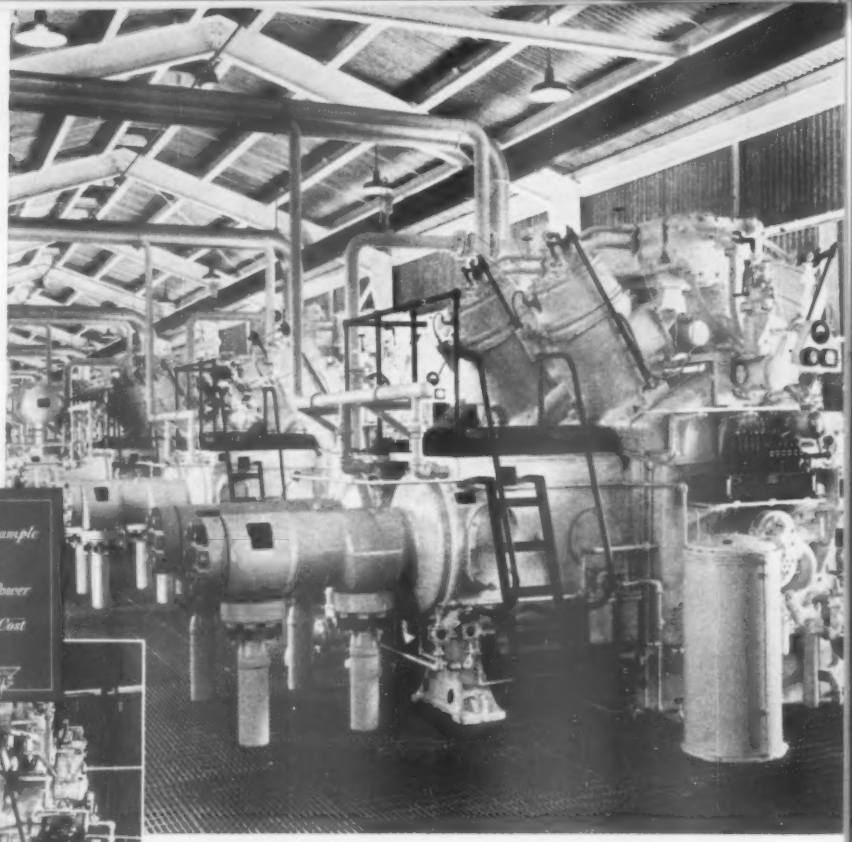
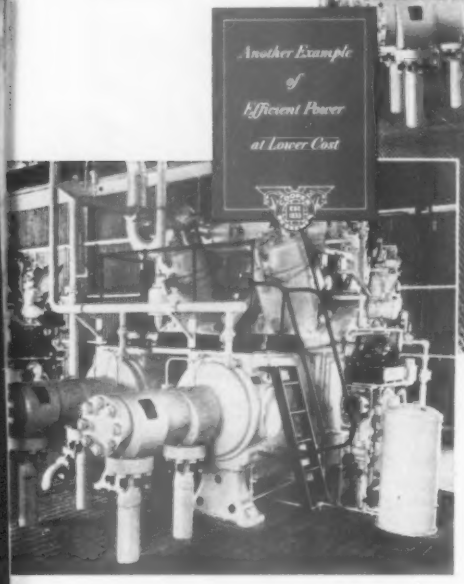
6300 hp line-up of GMV-10 and GMV-4 V-angle compressors in a large Texas synthetic ammonia plant. GMV-4 recirculator units are in foreground. GMV-10 process units in background.

Close-up of high pressure compressor cylinders on one of the GMV-4 units in recirculator service — first application of its kind.





THEY COUNT ON THESE GMV's *for smooth operation in high-pressure service!*

IN this Texas synthetic ammonia plant, these modern, reliable Cooper-Bessemer GMV's help in a big way to keep the process running smoothly. For example, GMV flexibility permits effective, dependable automatic control — set in this case to maintain constant suction pressure.

The compressor line-up consists of seven GMV's. Two are recirculator units — the *first* 2-cycle gas engine compressors to be used for such service. The other five are GMV-10 process units compressing a hydrogen-nitrogen mixture, through 5 stages, from 2 psig to 5300 psig.

Here, in Texas, this same company operates *fifty-four additional* GMV's in 4 light hydrocarbon plants — plenty of experience to know that GMV quality and features pay off. In fact, Cooper-Bessemer V-angles are doing a real job in many a chemical and petrochemical plant . . . offering installation and operating economies seldom if ever matched.

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Caracas, Venezuela Gloucester, Mass. Tulsa, Okla. New Orleans, La.

situation was shared by Russell B. Brown, general counsel of the Independent Petroleum Association of America.

Increasing imports now are presenting problems that "may prove far more serious than those which have confronted the industry for many years," Brown said.

He recalled government efforts in 1929 to "close down the search for and development of oil in the United States" and to supply markets then supporting the domestic industry from foreign production. At that time imports filled 10 per cent of total United States oil needs. This position, he said, was improved through efforts of domestic producers, until the country was importing only 3.2 per cent of total demand in 1933. By September of this year imports had climbed back to a rate of 12.5 per cent of total demand, and further increases are indicated.

The potential danger is great from a security standpoint, Brown said, in allowing this country to become more and more dependent on foreign oil, and it is just as great that the domestic industry will be weakened seriously by depriving it of a large share of its established market.

Trend Hearing Awaited

Future of Spraberry may be decided as result of arguments on wider-spacing briefs this week; activity at low point

Roy F. Carlson

AUSTIN.—Arguments of vital interest to all operators in West Texas' vast Spraberry trend will be heard here this week before the Texas Railroad Commission.

At stake is the future of operations in the half-million-acre area—whether the huge reef reservoir will continue to be developed on a 40-acre basis or whether wider spacing will be ordered.

The hearing will be held December 10. Principal argument is expected on the question of whether the commission has the power to issue field orders on the basis of economics or whether it can act only to prevent waste.

This question was raised in September when voluminous testimony was presented before the commission both for and against the question of wider spacing. This hearing was on a request of 53 Spraberry operators for a wide-spacing order. Much of this testimony was interpreted in some quarters as indicating that the spacing request was made in order to increase profits, or to assure profits, rather than to prevent waste.

Briefs were filed following the September hearing, and arguments on those briefs will be heard Wednesday.

Those favoring wide spacing will argue that correlative rights of minerals owners will be violated if spotty, isolated 40-acre development is permitted to continue. Uniform wide spacing, this group contends, will result in uniform development throughout the trend. Waste also will result if wide spacing is not ordered, they say, because large areas which would not pay out on a 40-acre spacing pattern would be left undrilled.

Opponents of wide spacing will try to show that statutes will not permit granting of such a spacing order on the evidence presented to date.

Development slowdown . . . The importance of the commission's ultimate decision can be seen in the accompanying figures showing the trend in Spraberry activity in the last 4 months. During the last week in November, completions averaged only 1 a day, the lowest in many months of development.

At the beginning of this month, only 41 rigs were active in the area, contrasted with 200 or more which were running early this year.

Some of the slowdown has been blamed on a lack of casing, but generally the blame has been placed on the fact that many wells in the trend will not pay out on a 40-acre spacing pattern and most operators are awaiting a decision from the Railroad Commission before determining their future drilling programs.

Engineering testimony presented at the September hearing of the Railroad Commission indicated that a Spraberry well will drain 160 acres and would be profitable even at the trend's low per-acre recoveries.

SPRABERRY TREND DATA, WEEK ENDED NOVEMBER 28

Field and county—	Active rigs	Completions—Oil	Completions—Total	Completions—Cum.	Est. cal. day allowable	Est. cal. day prod.	Actual cum. prod. 10-31
Aldwell, R	9	0	0	93	7,100	4,000	556,000
Benedum, U	4	0	0	139	11,000	8,600	1,700,000
Driver, MGR	14	2	2	435	37,000	26,000	6,170,000
Flatrock, U	0	0	0	3	160	140	56,000
Germania, MMr	0	0	0	81	5,500	2,900	1,500,000
Midkiff, MU	0	0	0	85	7,200	4,800	1,200,000
South Midland, M	0	0	0	2	.....	.....	26,000
Pegasus Spraberry, M	0	0	0	2	60	30	6,000
Pembrook, UR	1	0	0	195	16,000	9,000	2,600,000
N. Pembrook, UR	3	1	1	298	25,000	15,000	3,400,000
N. Sawyer, R	0	0	0	.....	.....	.....	600
Scharbauer Spraberry, M	0	0	0	1	.....	.....	1,800
Tex Harvey, MG	4	1	1	582	43,600	18,500	11,400,000
Warfield Spraberry, M	0	0	0	1	.....	.....	2,800
Weddell, RS	2	1	1	.....	2,500	1,600	300,000
Weiner-Floyd, MR	4	2	2	259	23,000	17,000	2,700,000

M—Midland, R—Reagan, U—Upton, G—Glasscock, Mr—Martin.

SPRABERRY DRILLING AND COMPLETION DATA

Date August—	Locations	Active rigs	Completions—Oil	Completions—Total	Cum. oil
8	155	80	21	24	1,965
15	152	63	27	28	1,992
22	150	73	15	16	2,007
29	143	64	25	25	2,032
September—					
4	143	60	24	26	2,056
12	143	54	13	14	2,069
19	...	60	17	18	2,086
26	...	61	19	21	2,105
October—					
3	...	61	12	14	2,117
10	...	53	13	14	2,130
17	...	45	14	14	2,144
24	...	38	16	16	2,160
31	...	40	21	21	2,181
November—					
7	...	40	11	12	2,192
14	...	37	8	9	2,200
21	...	37	10	10	2,210
28	...	41	7	7	2,217

These 4 TYPES OF Rods Meet Every Pumping Need

You can count on dependable performance, low pumping costs and minimized down-time when you use Bethlehem Sucker Rods.

Bethlehem Sucker Rods make possible these worthwhile advantages because they are carefully made from high-quality steel. They come in four types, to satisfy virtually every requirement from medium-pumping duty in non-corrosive wells to heavy-pumping duty in corrosive wells.

The Bethlehem X, XX, and X2 Rods come fully normalized. The "46" Rod is both fully normalized and fully tempered. All four rods are tough and durable, and have the high mechanical properties required for economical service.

Here's another money-saving feature of Bethlehem Rods. They reach your yard in A-1 condition because they come in a well-designed unit package that protects each rod against kinking.

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LATIN AMERICA

Oil Threat Develops

Liberal vote running surprisingly strong in Venezuelan election; censorship imposed as outcome remains in doubt

Dabl M. Duff

THE relative stability which the petroleum industry has enjoyed in Venezuela the last several years was threatened by political developments in that country last week.

The new provisional president, Col. Marcos Perez Jiminez, who was installed by the army, formerly was a member of the now-dissolved three-man junta which has been ruling the country since it took over from the Accion Democratica in 1948. His accession came less than 24 hours after early returns showed the liberal U.R.D. party (National Democratic Union) leading in the national elections by a substantial majority.

A news censorship obscured the situation, and the direction in which events were moving was not completely clear. The government was firmly retaining its control of the country, and oil operations appear to be in no danger, barring a possible outbreak of violence.

With the installation of Col. Perez Jiminez, the government announced later election results which showed its own F.E.I. party leading with around 570,000 votes out of 1,193,000 counted. About 1,800,000 Venezuelans had been expected to cast ballots.

Surprise results . . . The strong showing made by the U.R.D. was a surprise, since the government party had been widely forecast to win. Although Dr. Jovita Villalba, the party's head, said the earlier U.R.D. stand on oil and iron had been misinterpreted and that it was not demanding nationalization, the party platform called for the formation of a government-owned oil company, the refining of 50 per cent of production within the country, nationalization of the sale of gasoline, higher taxes on the oil companies, revision of the "iniquitous iron contracts," and termination of the "suicidal policy of the open door which is permitting monopolistic invasion of the national market by great international trusts."

The other opposition group was the Copei party, which asked for increased industrialization and for aid to private initiative. This group is anti-Marxist and "Christian Socialist." The favored government-backed coalition, F.E.I. or Independent Electoral Front, campagned on the basis of the junta's administrative record.

Rumors circulate . . . Unofficial reports were published outside Venezuela that the government had arrested the leaders of the opposition parties after the election. However, Col. Perez Jiminez, in a speech to the nation, said the government would have "absolute respect" for the election results and that he would work for a "climate of understanding and national accord."

The fast-moving situation was being closely followed by the petroleum industry which has investments totaling about $2,300,000,000 in the country. Venezuela is the world's largest oil exporter and derives more than 98 per cent of all its foreign exchange from petroleum. The 12 operating oil companies followed their usual policy of strict neutrality in the political campaign. In the past they have shown an ability to work with whatever group is in power.

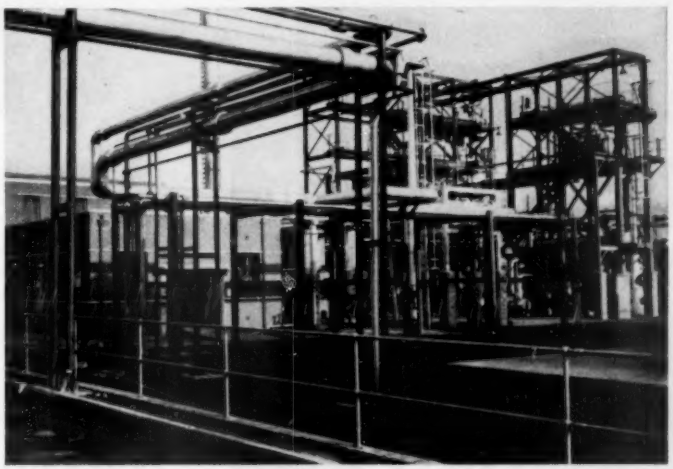
The possibility of control by U.R.D. raised the likelihood of additional oil taxes which would be reflected in costs of production. These already are among the highest in the world, and further increases would tend to price Venezuelan production out of world markets. The election outcome also may affect adversely the chances that the Venezuelan Government will carry out its indicated intention to grant new oil concessions for the first time since 1944.

Creole's Output Rises

Creole Petroleum Corp's operated production in Venezuela showed an increase of 49,094 bbl. daily, or nearly 7 per cent, in October.

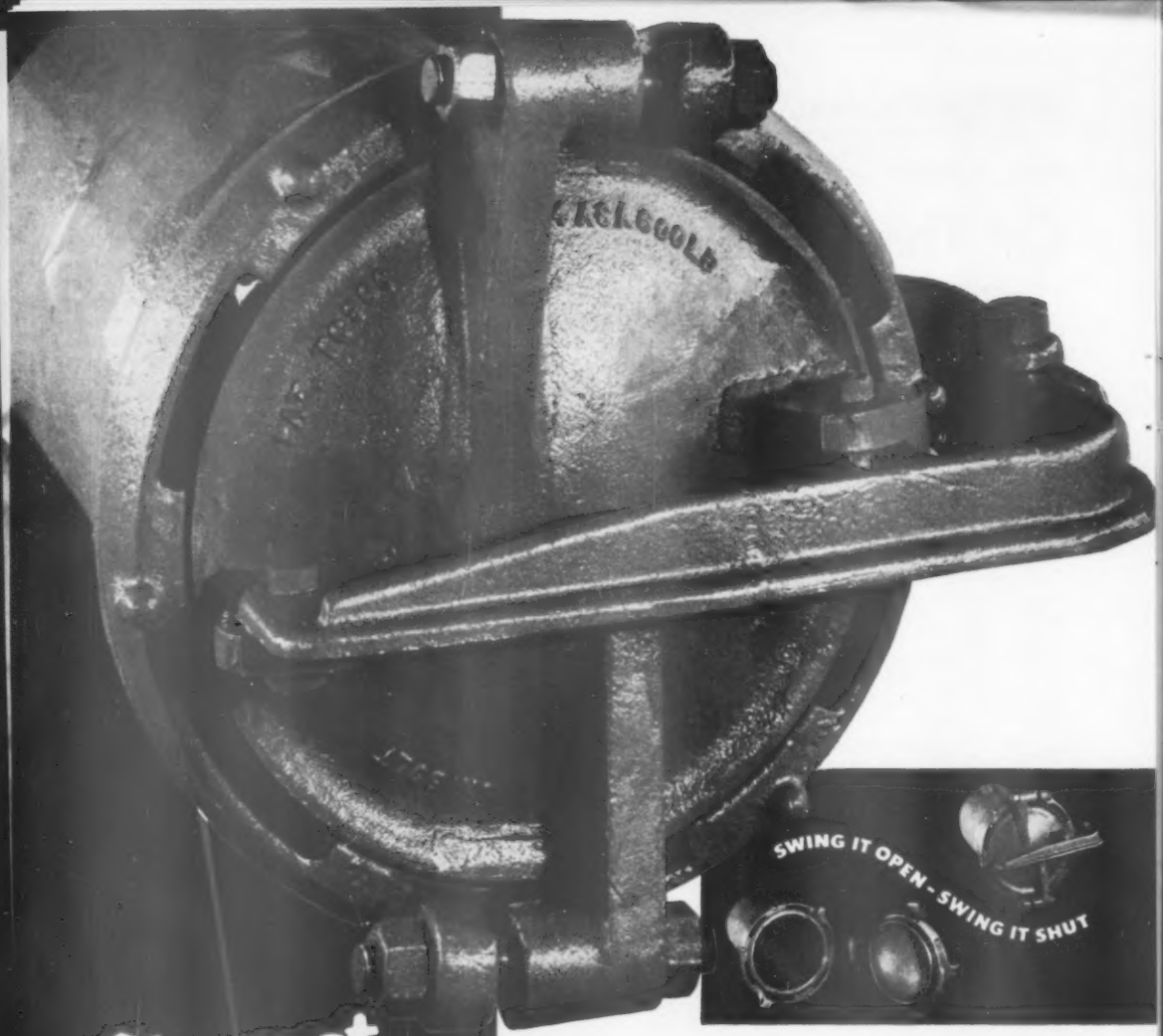
The company's monthly report lists total operated output at 771,488 bbl. daily, consisting of 644,471 bbl. daily from Lake Maracaibo, 4,168 bbl. daily from Cumarebo and Mara, and 122,849 bbl. daily from Eastern Venezuela. Net production plus purchased royalty amounted to 824,427 bbl. daily.

The company operated an average of 19.5 rigs during October, compared to 18 the previous month. Refinery runs averaged 61,446 bbl. daily at Caripito and 28,150 bbl. daily at



World's First Commercial Autofining Unit

Using the new catalytic desulfurization process developed by Anglo-Iranian Oil Co., Ltd., is this plant at the company's Llandarcy refinery in South Wales. This autofining unit has a capacity of 3,500 bbl. per stream day and produces solvent naphthas and power kerosines. For descriptions of the new process, see The Oil and Gas Journal, March 17, page 169, and September 8, page 67.



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The UNIBOLT Hinged Scraper Trap with self-sealing gasket swings open and shut like a door by simply releasing two bolts. No heavy lifting . . . nothing to fall on workmen . . . no leaks . . . no time-consuming multi-bolt flanged closures. Installed on an oversize barrel, it's no job at all to get a pig in or out of this trap.

These simple, convenient closures are equally desirable for gas line blowdowns, strainers, terminal manifolds, or any other service where pressure vessels must be opened for inspection, cleaning, repairing, connecting to a line, etc.

Bulletin PL-*510* will gladly be sent on request.

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UNIBOLT SCRAPER TRAP

Amuay. Twelve field wells and two exploratory tests were completed. Of the latter, one was dry at 5,450 ft. in Quiriquire, and the other an oil producer, 5,023 ft. total depth, and 2,448 bbl. daily initial production, in Maracaibo.

Squeeze in Ecuador

Rising costs, fixed prices pinching local oil company

ANGLO-ECUADORIAN OILFIELDS, LTD., which carries on a small, integrated operation in Ecuador, has been caught in a squeeze between rising costs on one hand and fixed prices for both its crude oil and products on the other.

The company's production, which last year amounted to 269,130 tons, or an average of 5,600 bbl. daily, accounts for 75 per cent of total Ecuadorian output.

The Anglo-Ecuadorian chairman, Lord Forres, in his recent annual statement in London, pointed out that a decline in profits was largely attributable to cost-price situation. The company's export sales of crude oil are based on East Texas and Mid-Continent prices which have remained unchanged since 1947, and the government of Ecuador has not authorized any increase in sales prices of refined products within the republic since 1948. On the other hand, besides marked increases in materials prices, wages were substantially boosted under a collective agreement. The company chairman said the government of Ecuador should give urgent attention to the matter of higher sales prices for products.

Lord Forres reported the company has had little success in its continued search of a new deep oil pool. During the year ended March 31, of the three exploratory wells drilled, two were dry and the third had an initial production of 30 bbl. daily.

However, shallow development continues satisfactorily. The new producing area in the Santo Tomas area is not yet fully defined. Wells in this section have a normal initial production of 50-70 bbl. daily, but last September 13 a well was completed in the area which flowed more than 1,000 bbl. daily. To the end of October, it had produced 40,000 bbl. in 48 days.

The company chairman said the output of this well was responsible for the increase in the company's production in September and October. However, he emphasized that it was merely an offset to existing wells and that, as with all high-producing shallow wells, it will decline rapidly.

Quotas Again Hurt

Restrictions in Argentina exclude U. S. oil exporters

ARGENTINA'S acute economic situation has again reacted against American suppliers of oil into that country

Quotas for imports of crude oil during the coming year virtually exclude United States oil companies from the trade, according to reports from Buenos Aires. This is the result of the country's lack of dollar exchange, a chronic condition in Argentina since the end of the war but understood to have become even more serious in recent months.

Sterling suppliers of Kuwait crude, namely Anglo-Iranian Oil Co., Ltd., and Shell Mex Argentina, Ltd., have most of the allocation. This follows the pattern that was set when the first of the annual British-Argentine reciprocal trade agreements was signed several years ago. The British are large buyers of Argentine meat and other commodities and lean heavily on oil shipments to make payment. British-Argentine trade is largely complementary, while most of what Argentina produces is also produced in quantity in the United States.

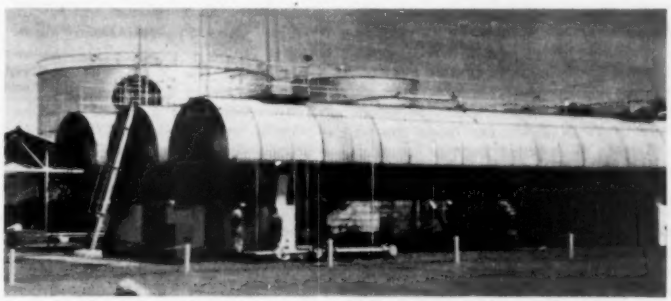
Argentina's crude imports amount to about 60,000 bbl. daily. Last year crude imports totaled 20,900,000 bbl., or about 57,000 bbl. daily, out of total imports averaging around 111,000 bbl. daily. Affiliates of Standard Oil Co. (N. J.), the only integrated American interest in Argentina, have a refining capacity of about 24,000 bbl. daily and small production.

Last month, the Argentine Government in Buenos Aires announced that the National Iranian Oil Co. had submitted the lowest bid for the supply of about 40,000 bbl. daily of crude oil during 1953. However, it was understood the offer was rejected because neither Iran nor Argentina has a fleet of tankers capable of moving any important volume of oil.

Venezuelan Exploration Up

The tempo of exploration work as measured by the number of parties in the field shows a marked increase in Venezuela.

Parties operating in September totaled 42. This figure compares to 33 parties in the field in September 1951 and 36 in August 1952. The 42 parties last September consisted of 19 geological field crews, 17 seismograph, 2 structure drill, 3 gravity meter, and 1 magnetometer.



STORAGE TANKS for L.P.G. at the Catia de la Mar terminal. (Shell photo).

Sea Lines Carry L.P.G. in Venezuela

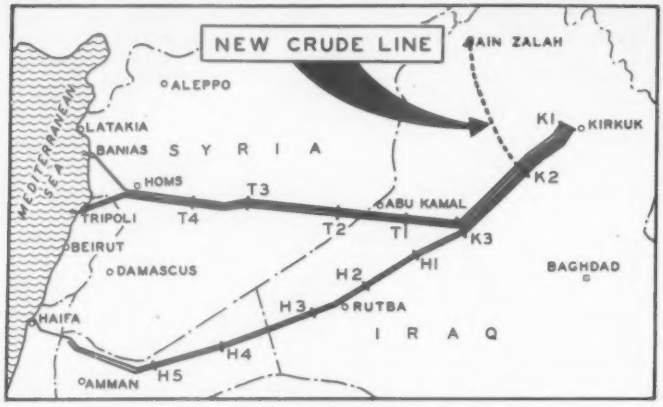
SEA lines at the Catia de la Mar petroleum terminal serving Caracas in Venezuela are now being used for the discharge of L.P.G.

The first use of these submarine lines for this product was made recently by the Shell organization to improve the supply of L.P.G. in Venezuela's capital.

The L.P.G. is shipped in bulk by tanker from Shell Caribbean Petroleum Co.'s refinery at Cardon on the Panaguana Peninsula. It is discharged through a 4-in. submarine line about ¼ mile in length.

In discharging the L.P.G., water is pumped through a second line into the cargo tanks of the ship to force out the L.P.G. An automatic water separator prevents the discharge water from passing through to the storage tanks.

At the Catia de la Mar terminal on the coast, the L.P.G. is moved into a storage installation of about 140 tons, or approximately 1,500 bbl., capacity. From Catia de la Mar, the liquefied gas is pumped through a 10¼-mile, 8-in. line to the storage terminal at Caracas which has a capacity of 280 tons, or about 3,000 bbl. At Caracas facilities have been installed for bottling the L.P.G. in cylinders for consumer distribution.



Ain Zalah Producing

Completion of 134-mile, 12-in. line allows I.P.C. to put 12-year-old northern Iraq field on commercial production

AIN ZALAH field, located in northern Iraq near the Turkish and Syrian borders, has been brought into commercial production by the Iraq Petroleum Co., Ltd., organization.

The opening of the field was made possible by the completion of a new 12-in. pipe line which I.P.C. built along a 134-mile route connecting with Station K-2 on the main system from Kirkuk field to the eastern Mediterranean. At K-2, the line joins the 12 and 16-in. lines which lead to a tanker terminal at Tripoli in Lebanon.

I.P.C. reported in London that production from Ain Zalah in October, the first month its output was exported, amounted to 51,744 long tons, or an average of about 12,400 bbl. daily. Total production for the field thus far this year through October was 85,886 tons, or about 638,000 bbl.

Ain Zalah becomes the fourth commercially producing field in Iraq and the eleventh in the Middle East, not counting the largely shut-in fields in Iran. The principal field in Iraq is Kirkuk, the production from which reached 443,300 bbl. daily in October, the latest in a series of monthly records resulting from the completion of the new 30 and 32-in. pipe line to Banias, Syria. Other Iraq fields are Zubair in southern Iraq and Naft Khaneh in the small eastern Iraq concession of Anglo-Iranian Oil Co., Ltd.

Mosul Petroleum Co., Ltd., associated with I.P.C. and under the same ownership, operates Ain Zalah field as a part of its concession in Iraq lying west of the Tigris River and north of 33° Latitude. About half way between Ain Zalah and station K-2 on the pipe-line system are a group of four shut-in fields, also in the Mosul company's concession. These are Jawan, Najmah, Qaiyarah, and Qasab, all of which produce 20° gravity crude.

Ain Zalah has a proved area of about 3600 acres and produces 32.8° gravity crude from a closed anticline at depths averaging around 5,500 ft. Average thickness of the Cretaceous limestone pay is about 200 ft. in comparison to the approximately 800 ft. of pay in Kirkuk.

The field was discovered in 1940. Its production comes from ten wells. One rig has been running in the area.

The commencement of commercial production from the field in October was well in advance of the deadline specified in the Mosul concession. This committed the company to begin regular export of oil before March 3, 1953. The field is expected to produce about 20,000 bbl. daily initially and later around 25,000 bbl. daily.

I.P.C. also announced that all three of its major fields in the Middle East—Kirkuk and Zubair in Iraq and Dukhan in Qatar—set new production records in October. Besides Kirkuk's output of 1,808,211 tons, or about 443,300 bbl. daily, Zubair (Basrah Petroleum Co., Ltd.) totaled 247,725 tons, or 59,300 bbl. daily, and Dukhan (Petroleum Development [Qatar] Ltd.), 300,127 tons, or about 75,500 bbl. daily.

Big Field Named

Arabia's Ghawar to include some of world's best pools

THE name Ghawar field has been given to the one large, now-connected producing area located west and south of Abqaiq in Saudi Arabia.

Uthmaniyah, Ain Dar, and the new Shedgum are individual producing areas within the larger Ghawar. The new Shedgum area northeast of Uthmaniyah now has two completed wells and two wells drilling.

Fifty wells have been completed in Ain Dar, and one is drilling. Uthmaniyah has 22 completions and two wells drilling. These areas, ranking among the world's most important oil reservoirs, have been developed by Arabian American Oil Co. on a ring-spacing plan using 3½-mile stepouts *(The Oil and Gas Journal, November 1, 1951, page 40).*

Only one of the three areas of Ghawar now producing is Ain Dar, which has an output in excess of 300,000 bbl. daily. This is the crude which is handled in three 100,000-bbl. daily capacity separator plants built in Ain Dar.

This production is being augmented by Ain Dar Separator Plant No. 4 which went into operation recently in the southern part of the field. It is also a 100,000-bbl. daily unit, and the crude moves to Abqaiq through a new 30 and 31-in. line.

Uthmaniyah is scheduled to go into commercial production in the near future. The first separator plant in this area, and the fifth in the greater Ghawar field, is almost finished. The 30 and 31-in. line also will move the crude from this plant. The line itself was completed last summer and has been in temporary water service pending completion of the southernmost Ain Dar separator plant.

Aramco drilling crews recently set new company records for drilling time in Ghawar field. Uthmaniyah 19 was 42 days from spudding to release, and Ain Dar 15 established a record of 46 days from spudding to release for a well coring the entire producing section.

Aden Refinery Plans Outlined

Process equipment planned for the new refinery which Anglo-Iranian Oil Co., Ltd., is building at Aden at the southwest corner of the Arabian Peninsula, will include two atmospheric distillation units complete with stabilizers and washers.

Other facilities will be one platforming unit and one sulfur dioxide extraction unit. The power station is to have an installed capacity of 30,000

kw. and the capacity of the boiler battery will be 600,000 lb. per hour. Cooling water will be taken from the sea and returned through the latest type of oil-water separators.

About 150 key employes of the Middle East Bechtel Corp. and George Wimpey & Co. are now at the site. They arrived at Aden on the 9,789-ton British liner Dorsetshire which will serve as a floating camp during the early days of construction of the plant.

The Aden refinery will have a capacity of about 100,000 bbl. daily and when completed in about 2 years will be the third largest operating refinery east of Suez, ranking after Bahrein and Ras Tanura in the Persian Gulf.

Concurrent with the plant's construction, the company is building a major oil port and a complete new town 6 miles west of Aden. The oil port occupying about 50 acres will include turning circle and approach channel and will be protected by a large breakwater. Dredged sand will be pumped on to the foreshore to form a flat area on the steep coast for port and other buildings.

Housing Plan Pushed

Aramco encouraging home ownership among workers

ARABIAN AMERICAN OIL CO. has launched a new program to encourage home ownership by its Saudi Arabian employes.

Interest-free loans are being offered through the company's Community Development Division to Saudi employes who have demonstrated their ability as workmen and who are above a stipulated salary level. In addition, technical advice and assistance in home design and building have been made available, both for new construction and for remodeling of existing dwellings.

As a result of the program, 30 employe housing loans have been approved, and a number of new homes are being built in the established towns within the company's area of operations in Al Hasa Province in eastern Saudi Arabia. During the past year the plan has been functioning on an experimental basis but is now formally in effect with some revisions dictated by the experience acquired.

Tied in with this program of home loans and guaranteed rentals is Aramco's community-development project under which well-designed townsites are laid out in areas near the company's operating centers. Last year, sites were surveyed and laid out in Nariya and Ain Dar, and the Thugba layout was extended and additional water provided.

The new Rahaima community near Ras Tanura where work was begun a year ago has been planned with recreational, commercial, and residential districts. This new townsite has been laid out, and partly graded and marked. A total of 130 lots have been allocated by the government, and quarters for 48 families are under construction. A water well has been drilled, and work is to start soon on water mains for the community. Another new Aramco townsite is located about 6 miles from Abqaiq toward Hofuf.

At the end of last year, 13,786 of Aramco's nearly 22,400 employes were Saudi Arabs. In addition, independent Saudi Arab contractors serving the company had another 7,240 employes. Aramco has followed a policy of stimulating the activities of these independent contractors to the point where they have been able to take over profitably many responsibilities which the company might otherwise have to provide.

Oil Discovery Minimized

According to reliable reports in the industry, the oil discovery recently reported in northern Tunisia actually was a heavy blow of gas. The Bahloul well near Maktar encountered a gas-bearing limestone at 518 m. (1,700 ft.).

Flow was estimated at approximately 1,000,000 cu. ft. daily. Closed-in pressure was about 57 psi. The well test was started in the Cretaceous, but the age of the formation in which the gas was found was not reported. The well, located about 78 miles southwest of Tunis, is being drilled by the French company, SEREPT *(The Oil and Gas Journal, November 17, page 253)*. Slight traces of oil were found in cores taken earlier, and the operator is understood to be drilling ahead.

EUROPE

British Orders in U.S. Gaining

Orders placed in 1952 for materials and equipment for British oil companies for use in the United Kingdom and overseas should be worth £90,000,000 to £100,000,000 ($252,000,000 to $280,000,000), an official of the Council of British Manufacturers of Petroleum Equipment said recently in London.

This represents a substantial increase over similar orders placed in 1951 which totalled just under £84,000,000. In the third quarter of the year, orders received from British oil companies were worth £24,991,200, bringing the total for the first 9 months to approximately £70,000,000. The figures exclude orders for tankers which account for many more millions, and orders placed direct by foreign, mainly American oil companies.

One reason for the present high level of orders was the agreements which have been concluded with United States oil companies, as a result of which their sterling balances were being utilized to purchase tankers and equipment in the United Kingdom, usually through affiliated British companies.

International Briefs

The largest combined tanker-ore ship, the 25,400-ton Tarfala, has been launched by the Goeta Yards of Gothenburg, Sweden. The vessel was ordered by the Swedish Graengesberg-Oxeloes und Co. Similar smaller ships have been built for the same company in the past. They are fitted with cargo ore holds and are designed to carry ore on the outgoing trips and oil on the return voyage to avoid sailing in ballast.

C. Deilmann Bergbau, G.m.b.H., has reached an agreement with the Spanish company, Cia. Espanola de Petroleos Cientificas Investigaciones (Ciepsa), to participate in the Ciepsa's program to explore for oil in the Ebro Valley in Spain. According to information from Bentheim, West Germany, where Deilmann has offices, work will get under way in the near future, and the Deilmann company will send geophysicists and a drilling crew to Spain.

Commencement of a new test well in Britain has been reported by Anglo-Iranian Oil Co., Ltd. The well is in the Caunton area of Nottinghamshire in central England and is being drilled to determine the possibility of a northerly extension of the small field now being operated at Caunton.

Arabian American Oil Co. has taken delivery of the first of two new 40-passenger Convairs to be added to the fleet of aircraft which the company operates. The plane has been placed in service between Beirut, Lebanon, and Asmara, Eritrea, East Africa. Within the last few months, Aramco also received two new DC-6B's which have replaced the older DC-6's used on the scheduled trips between New York and Dhahran, Saudi Arabia. Aramco makes wide use of aircraft in its operations *(The Oil and Gas Journal, October 18, 1951, page 82)*.

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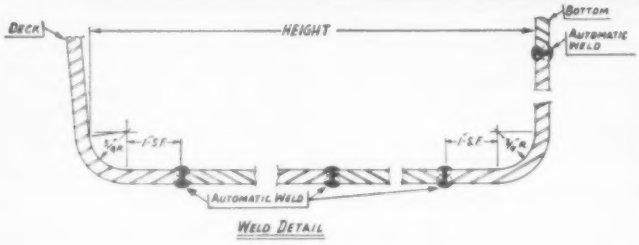

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Production Head

F. H. Rhees assumes new post with Sinclair firm

F. H. (Herb) Rhees, 46, the newly appointed vice president and manager of the production department of Sinclair Oil & Gas Co. at Tulsa, got his start with the company 27 years ago.

He joined Sinclair as a roustabout in the Osage district. Subsequently he became a clean-out driller, petroleum engineer, district petroleum engineer, division petroleum engineer, assistant division superintendent and division superintendent.

While serving in the latter positions Rhees specialized in secondary-recovery problems.

On October 1, 1949 he was promoted to general superintendent at Tulsa, a position he held until his elevation to the vice presidency.

Although he was born in Selma, Ind., Rhees moved to Oklahoma as a child. He attended both the University of Oklahoma at Norman and the University of Kansas at Lawrence.

He is a member of the junior board of directors of Sinclair Oil Corp., and of the board of directors of Sinclair Oil & Gas Co. He also is active in numerous professional organizations.

T. Glen Caley, vice president of Basin Oil Co., Saginaw, has been elected president of the Oil and Gas Association of Michigan for 1943. Caley succeeds **J. V. Wicklund,** Detroit producer. Other officers elected by the board of directors November 21 include: **J. Walter Leonard,** Leonard Oil, Inc., Mount Pleasant, vice president; **E. Allan Morrow,** Roosevelt Oil & Refining Corp., Mount Pleasant, and **Kurt deCousser,** Socony - Vacuum Oil Co., Lansing, co-treasurers, and **William Palmer,** secretary. **J. V. Wicklund, Jr.,** and **R. Lee Browning,** Mount Pleasant oil attorney, were named to fill vacancies on the board.

Robert J. Munn has been appointed a field engineer for Duke Petroleum Co., Ltd. He is a graduate of Texas A. & M. College and formerly was associated with Rockwell Manufacturing Co., Houston.

George L. McMahon has been appointed chairman of the board of Canadian Atlantic Oil Co., Ltd. **S. R. Smith** was named to succeed him as president at a board of directors meeting in Calgary, Alta. **Frank M. McMahon,** chairman of the board of Pacific Petroleums, Ltd., and president of Westcoast Transmission Co. and Peace River Natural Gas Co., also was appointed a company director.

Albert W. Ward, Jr., has resigned as a geologist for Magnolia Petroleum Co. at Midland to become Permian basin geologist there for J. D. (Jack) Wrather, independent oil operator of Dallas and Los Angeles. **Joe Dubose** has been named to succeed Ward at Magnolia.

James B. Black, San Francisco, president of Pacific Gas & Electric Co., has been elected to the board of directors of Chemical Bank & Trust Co. He also is a director of United States Steel Corp., Southern Pacific Co., Equitable Life Assurance Society of the United States, Shell Oil Co., and Fireman's Fund Insurance Co.

Robert Hendrickson has resigned as assistant division geologist for Union Oil Co. of California to become chief geologist for Herman & George R. Brown.

E. F. Howard, vice president of International Petroleum Co., Ltd., a Standard Oil Co. (N. J.) affiliate operating in Colombia and Peru, has been elected to International's board of directors. He joined Imperial Oil, Ltd., Canadian affiliate of Jersey Standard, as an office boy in 1912, and has been a vice president of International since 1949.

Lester Clark, Breckinridge, last week was reelected president of West Central Texas Oil and Gas Association. Other 1953 officers selected at the association's annual meeting in Abilene include: **C. T. McLaughlin,** Synder; **Bob Carr,** San Angelo, and **Edgar Davis,** Abilene, vice presidents.

Francis W. Winn has been appointed assistant chief process engineer for Catalytic Construction Co. at Philadelphia. For the past 5 years he has been with the research and development department of Socony-Vacuum Oil Co., where he specialized in process design and economic studies of refinery equipment.

Alex S. Chamberlain and **Palmer C. Talbutt,** both of Ashland, Ky., have been named vice presidents of Ashland Oil & Refining Co. Chamberlain, who has been associated with the company more than 14 years, formerly was an executive assistant. Talbutt joined the firm in 1926 and was named to the board of directors last year.

Robert B. Stobaugh, Jr., has been appointed a chemical engineer for California Texas Oil Co., Ltd., in its refining division in New York. He formerly was with Creole Petroleum Corp. at its Amuay refinery in Venezuela.

J. Walter Davis, foreman for The Texas Co. at its natural-gasoline plant at Santa Fe Springs, Calif., has retired from active service after more than 34 years with the company. He is succeeded by **R. F. Vincent,** formerly natural-gas engineer.

Darrell Smith, district superintendent for The Texas Co. at Alice, Tex., since 1950, has been promoted to assistant division manager in South Texas. He succeeds **L. T. Tighe,** who has been named division manager. Smith's headquarters will be in Houston.

Edward B. Harry, Jr., petroleum engineer for Sohio Petroleum Co., has been transferred from Shreveport to Pauls Valley, Okla.

J. Eric Bucher has been appointed division geologist at Oklahoma City for Magnolia Petroleum Co. He succeeds **Dr. Walter L. Moreman,** who recently was transferred to Dallas as staff

geologist. Since his transfer from Midland, Tex., last spring Bucher has been assistant to Moreman.

George H. Gaul, consulting geologist, has moved his headquarters from Salt Lake City to Palo Alto, Calif. He will continue his work throughout the Rocky Mountain region.

L. M. Rambin, tool pusher for Penrod Drilling Co., has been transferred from Thibodaux to Morgan City, La.

Paul C. McDonald, general production superintendent for Murphy Corp., El Dorado, Ark., has been promoted to manager of the production department. He succeeds **R. D. Curtis,** who has resigned. **E. H. Haire, Jr.,** who since 1950 has been natural-gas superintendent, has been elevated to the newly created post of assistant manager of the production department. **W. J. Thornton,** who for the last several weeks has been acting general production superintendent, has been named to succeed McDonald.

William H. Powell, for the past 5 years in charge of the El Dorado, Ark., refinery of Macmillan Petroleum Corp., has been appointed vice president in charge of manufacturing and a member of the board of directors. He joined the firm in 1924 as a roughneck at the Signal Hill, Calif., refinery, and served as superintendent there from 1937 to 1947.

John E. Ambrose, formerly a process engineer for Chicago Corp. at Corpus Christi, has been appointed a research engineer for the Mellon Institute of Industrial Research at Pittsburgh.

John G. Lewis, Jr., has resigned as a junior petroleum engineer for Carter Oil Co. at St. Elmo, Ill., to become a hydraulics engineer for George L. Nankervis at Detroit.

Fred C. Koch, president of Wood River Oil & Refining Co., and of Fred C. Koch Engineering Co., has been elected to the board of directors of Chicago Corp. He replaces **E. P. Brooks,** dean of the school of industrial management at Massachusetts Institute of Technology, who has resigned.

Making Plans for A.P.I. Production Meeting

Preliminary arrangements are being made for the spring meeting of the Mid-Continent section of the American Petroleum Institute's Division of Production, to be held in Tulsa March 18-20. Discussing plans for the meeting are, seated, left to right, Eugene Hosford, Gulf Oil Corp., meeting arrangements chairman; H. O. Harder, Sunray Oil Corp., general arrangements chairman; W. H. Strang, assistant director of the A.P.I. Division of Production; G. C. MacDonald, Gulf, Mid-Continent section chairman; Harold Berg, Tide Water Associated Oil Co., advisory committee chairman; and Herb Cooley, Bethlehem Steel Co., district secretary and treasurer. Standing are Jack H. Beesley, Baroid Sales Division of National Lead Co., who was representing C. E. Wright, Signal Drilling Co., entertainment committee chairman; Guy F. Williams, Dowell Incorporated, publicity chairman; Frank Lindeman, Jr., Stanolind Oil & Gas Co., housing arrangements chairman; and Jack Abernathy, Big Chief Drilling Co., program chairman. Not present was Charles F. Elder, The Texas Co., registrations chairman.

Kenneth O. Austin, Wichita Falls, Tex., has been promoted to Texas district engineer for Deep Rock Oil Corp. He was in the company's water-flood operations program in Garnett, Kans., before being transferred to Texas last March.

Joshua S. Cosden, Jr., formerly president of Reiter-Foster Oil Corp. in New York since 1946, has taken charge of a new Rocky Mountain division office opened at Denver by Cosden Petroleum Corp. The firm was founded 25 years ago by his father, Joshua S. Cosden.

Harry R. Marsh has resigned as resident manager and chief engineer for the J. B. Gill Co. at Tulsa to open consulting offices there. He will specialize in matters concerning pipe-line compressor and pump stations and natural-gasoline plants.

G. L. Shoemaker, Stanolind Oil Purchasing Co., has been elected president of the Permian Basin Crude Oil Association. Other new officers are: **Lawrence B. Berry,** Shell Oil Co., vice president; **W. D. Kleine,** Phillips Petroleum Co., secretary editor; **C. W. Van Wagoner,** Crown Central Petroleum Co., treasurer; and **M. T. Smith,** Shell Oil Co., director to the National Oil Scouts and Landmen's Association.

Conrad E. Murphy, district measurement superintendent for United Gas Co., has been named president of the Ark-La-Tex Measurement Society. Other officers selected at a meeting in Shreveport include: **W. A. Stewart,** Arkansas Natural Gas Co., vice president; **Bruce Caldwell,** Texas Eastern Transmission Corp., treasurer, and **Ashley E. Elton,** United Gas Co. secretary.

Kenneth Freed, geologist who has spent the last 18 months in exploratory work for the Navy in Petroleum Reserve No. 4 in Alaska, has returned to Vincennes, Ind., to become a consultant.

Herbert L. McCracken, geologist for the Texas Railroad Commission, has assumed duties as examiner at oil and gas hearings. He began work with the commission in September 1949 at Kilgore. In March 1952 he was transferred to Austin to make a survey of secondary-recovery and pressure maintenance projects in Texas. The results of his study will be published in book form.

PERSONALS

Frank Shoup, a natural-gasoline plant chief operator for Phillips Petroleum Co., has been transferred from Phillips, Tex., to the Judkins plant at Penwell, Tex.

T. H. Kerlin, formerly of Tulsa, has become associated with West Texas Well Servicing Co. in Midland, Tex. Firm headquarters is in Odessa, Tex.

Frank D. Gardner, district representative for Sinclair Oil & Gas Co. in West Texas and New Mexico, has been named chief of the crude oil section of the Office of Price Stabilization. **Charles R. Spiegel, Jr.,** of the eastern divisional office of Tide Water Associated Oil Co., has been promoted to chief of the refining and marketing section of the petroleum branch of the OPS.

John B. Hussey, Shreveport oil and gas attorney, has been appointed Louisiana conservation commissioner. Hussey, a partner of Hussey & Smith, takes office December 10.

Earl M. Bagley has been appointed division geologist for Bishop Oil Co. at Midland, Tex. He is being transferred from Bakersfield, Calif.

G. T. Martin has been named a group leader at the Standard Oil Co. research laboratory at Whiting, Ind. He is in charge of technical service work on light oils distillation and coking processes. He joined the company in 1949 as a chemical engineer.

H. N. Pardee has been named manager of the newly organized Moncana Petroleums, Inc., with headquarters in Billings, Mont. The company is engaged in exploratory operations in Montana. Pardee for several years was manager of Tulsa offices of The Texas Co.

DEATHS

Vladimir Nikolaevich Ipatieff, 85, world-famous chemist and an important figure in the development of several refining processes, died November 29 in Chicago. He had been associated with Universal Oil Products Co. since 1930 and at his death was a part-time graduate instructor in Northwestern University's Technological Institute. In 1940 he was awarded the Willard Gibbs Medal for chemical discoveries basic to petroleum refining and to the development of synthetic rubber. He is generally given much of the credit for developing the polymerization, isomerization, and alkylation processes.

William B. Shanley, West Coast representative for Universal Oil Products Co., Des Plaines, Ill., died recently in Pasadena, Calif. Shanley, who had been with Universal more than 22 years, was active in the operation of polymerization, isomerization and alkylation units. During World War II he served on the alkylation subcommittee of the Aviation Gasoline Advisory Committee.

Albert Brown Chesebro, 71, former office manager for Carter Oil Co. at Tulsa, died there November 26. He also was chief accountant and assistant treasurer for Carter before retiring in 1931.

Luther Young Newman, 60, assistant manager of marketing for Magnolia Petroleum Co., died in Dallas recently. He had been with Magnolia 39 years.

Albert John Jones, 68, geologist, died December 1 in Los Angeles.

Sir Robert Waley Cohen, 75, who had been connected with the Shell Group since 1901, died at his home in London November 27. He was instrumental, with British oil companies, in endowing the School of Chemistry at Cambridge.

George Callihan, 64, West Texas independent oil producer and drilling contractor, died of a heart attack at his home in Abilene, Tex., November 26. He organized Callihan Rotary Co. in 1947.

Martin A. Parrack, 80, retired driller, died at his home in Tulsa November 30.

Charles G. Boone, 63, inventor of many oil field devices, died November 25 at his home in Tulsa. He had obtained 153 patents on hydraulic oilfield equipment.

Warren Sinsheimer, 67, for 35 years a technologist for Cities Service Co. and subsidiaries, died in New York November 28. He moved to New York about 25 years ago and until July 1951, was vice president of Petroleum Advisors, Inc., a Cities Service subsidiary.

Wade V. Thompson, 57, board chairman of East Tennessee Natural Gas Co. and president of Tennessee Natural Gas Co., died recently in Nashville of a heart attack.

W. C. Agurs, 82, Shreveport driller, died November 24. He developed Agurs & Josey Co., which was active in drilling operations in Caddo Parish, Louisiana, and in Texas and Arkansas.

William Salem Hart, 65, retired oilwell servicing operator, died recently in Long Beach. He lived in Oklahoma and Texas prior to moving to California in 1940.

Robert L. Morris, 74, independent oil operator, died November 30 at his home in New Orleans. He had been active in the oil industry in Ecuador and Denmark as well as in Louisiana.

George S. Allee, 79, former president of the Missouri Oil Men's Association, died November 30 in Kansas City.

Ronald C. Hall, 26, petroleum engineer trainee for General Petroleum Corp., at Taft, Calif., was killed recently when his monoplane crashed in the Big Santa Anita Canyon.

Dr. Richard E. Sherrill, 53, head of the department of geology and consulting geologist of the University of Pittsburgh, died November 25 in Haskell, Tex.

Al A. Buchanan, 61, San Antonio independent producer, died November 30 in Wichita Falls, Tex. He participated in many of the oil booms in Southwest and East Texas.

David S. Sowell, Sr., 83, Cleburne, Tex., owner of Cleburne Independent Oil Co., died there November 24.

Joe Jack Laycock, 58, accountant for Schermerhorn Oil Corp., died of a heart attack December 2 in Tulsa.

Raymond Harrison Whitney, independent oil operator, died in Dallas recently.

John Howell, director of Dominion Natural Gas Co., Ltd., died November 21. Prior to his retirement in April 1951 he had been in charge of the legal department of Dominion and of Republic Light, Heat & Power Co., Inc., Buffalo, N. Y.

PETROCHEM REPORT:

Ethylene From Naphtha or Gas-Oil Cracking

Methods at present in favor in the United States for ethylene production are: (1) by recovery from refinery "waste" gases and (2) by cracking of ethane and propane. Naphtha and gas-oil cracking, now used in Europe for olefin production, will become more important as the demand for olefins increases.

Ethylene yields up to 32 weight per cent from heavy naphtha and 26 per cent from gas oil can be obtained in the process described here. This is accomplished by cracking with steam in the ratio of 0.5 to 2 lb. of steam per pound of oil. Virtually all the steam is recovered in quench boilers.

Better than 99.5 per cent pure ethylene can be recovered from the cracked gases by low temperature fractional distillation employing propylene, ethylene and methane refrigeration.

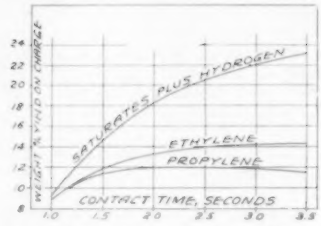


Fig. 1—Heavy naphtha cracking, 1,300° F., 20 psia.

by C. C. King* and J. Warburton*

THE lower olefins, particularly ethylene, have been important and are becoming increasingly more so as feed stocks for numerous chemical-manufacturing processes. Uppermost among the expanding uses of ethylene may be counted the new polyethylene plastics, ethylene glycol and tetraethyl lead. To meet these demands several plants have been built in the United States and more are being constructed to recover ethylene from refinery gases, and in other cases to produce ethylene by the pyrolysis of ethane, propane, and heavier hydrocarbons all of which are potential sources of ethylene.

In Europe, with the lack of a large and steady supply of refinery gas, chemical manufacturers have chiefly turned to heavier oil fractions such as naphtha and gas oil for olefin production. There have also been incidentally a number of plants in Europe recovering ethylene from coke-oven gases. It is doubtful that this latter source is economic in present-day competition with petroleum sources.

In 1946 a pyrolysis pilot plant cracking naphtha and gas oil to produce high yields of olefin was operated in the laboratories of M. W. Kellogg Co. Subsequent to the completion of the pilot plant work a plant was designed and built for the Imperial Chemical Industries, Ltd., at Wilton, England. This plant has now been in successful operation for over a year. A second plant is now under construction in Italy.

The Kellogg process produces high yields of olefins and minimum paraf-

*M. W. Kellogg Co. Paper presented at Oklahoma state meeting of A.I.Ch.E., Tulsa, 1952.

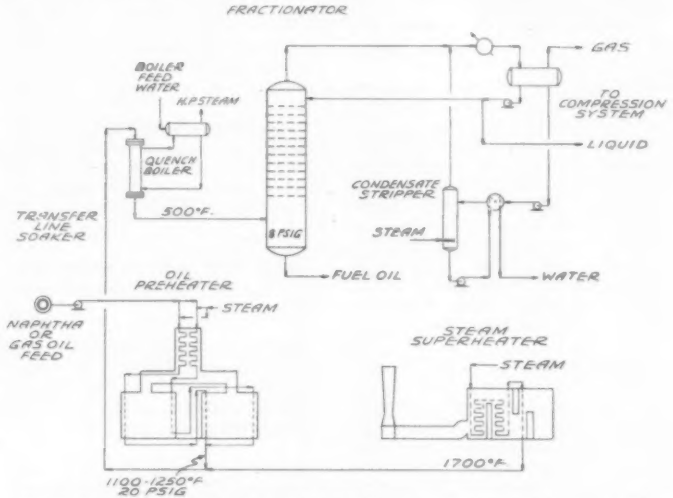


Fig. 2—Pyrolysis section of plant producing ethylene by cracking naphtha or gas oil.

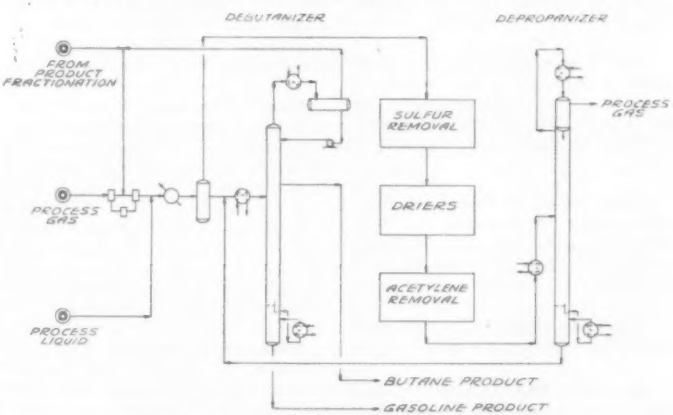


Fig. 3—Butane fractionation and gas purification.

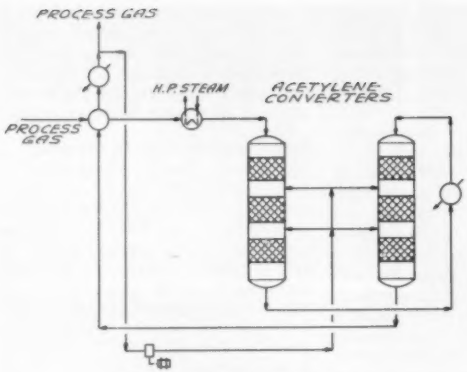


Fig. 4—Acetylene removal system.

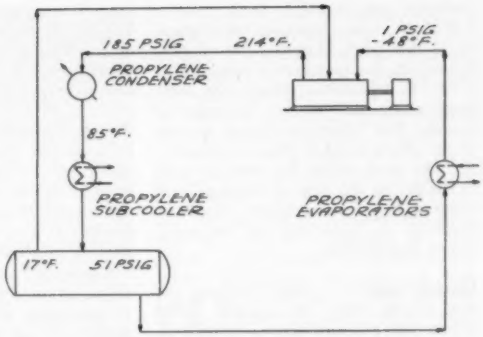


Fig. 6—Propylene refrigeration system.

fins with no significant coke formation. Ethylene yields of up to 32 weight per cent from heavy naphtha and up to 26 weight per cent from gas oil have been obtained. At the same time the process possesses high flexibility so that a commercial plant may be operated under different conditions to produce the olefins in varying proportions. This latter feature is of importance to the chemical manufacturer whose markets for the chemical derivatives of propylene, for example, may vary with respect to the market for ethylene derivatives. A typical commercial plant would be able to produce a range of yields as shown in Table 1 from heavy naphtha and in Table 2 from gas oil. It may be noted that the yields produced from gas oil are very similar to those from naphtha.

Ethylene recovery . . . The second important feature of the Kellogg process design is a low-temperature recovery system producing ethylene of high purity with high recovery. This low-temperature system has proved its ability to remain in continuous operation without periodic shutdown for deicing, a usual procedure in many plants built heretofore. At the same time the process has proven its ability to continuously produce ethylene of 99.9 per cent purity. The recovery of ethylene in the low temperature fractionation system is better than 97 per cent.

TABLE 1
Pyrolysis of Heavy Naphtha by Kellogg Steam Cracking Process

Gas products weight per cent—	Low conversion operation	High conversion operation
Hydrogen	0.4	0.8
Methane	6.2	10.9
Ethylene	11.8	22.5
Ethane	3.0	2.4
Propylene	10.5	12.0
Propane	0.4	0.4

TABLE 2
Pyrolysis of Gas Oil by Kellogg Steam Cracking Process

Gas products weight per cent—	Low conversion operation	High conversion operation
Hydrogen	0.2	0.5
Methane	6.1	9.0
Ethylene	11.0	21.3
Ethane	4.0	3.1
Propylene	10.6	14.6
Propane	0.9	0.6

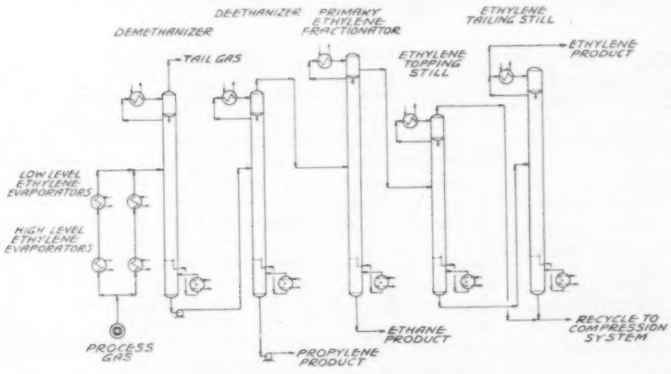


Fig. 5—Product fractionation system.

Cracking requirements . . . In the cracking of naphtha and heavier hydrocarbon fractions, it is desired (1) to achieve a high yield of olefins to reduce the consumption of valuable feed stock to the minimum, and (2) to suppress the formation of saturated gaseous hydrocarbons to make the problem of gas separation as easy as possible. These two requirements are not completely compatible.

Under ordinary conditions of cracking, as the contact time is increased the formation of ethylene and propylene levels off and finally decreases while the formation of hydrogen and methane continues. This effect is shown in Fig. 1. If in this case we compare cracking at a contact time of 1.5 seconds with a contact time of 3.5 seconds we find that we increase the yield of ethylene by 20 per cent while there is a corresponding increase in the production of saturates of 58 per cent.

There would be two objections to operating in this case at the higher conversion. First, the cracked gas is more dilute in olefins and therefore requires a larger gas-recovery plant for a given tonnage of ethylene. Secondly, a larger quantity of naphtha is degraded to fuel gas per ton of ethylene produced thereby resulting in a higher net feed stock cost charged against ethylene and propylene. It is for these reasons desirable to find a process which will produce a high yield of olefins while minimizing the production of saturate gases.

. . . Cracking With Steam

The principal features of the Kellogg cracking process are (1) vapor-phase cracking with superheated steam and (2) recovery of waste heat by quench boilers. The pyrolysis section of the plant is shown in Fig. 2. Naphtha or gas oil feed is pumped through the oil

preheater and heated to about 1,100°-1,250° F. Some cracking takes place up to this point. Leaving the oil preheater, the hydrocarbon is joined with 1,700° F. superheated steam. The combined steam and oil flow through the transfer line where the major portion of the cracking takes place adiabatically. The steam serves the dual function of supplying the heat of cracking and lowering the partial pressure. Depth of cracking is controlled by adjusting steam and oil ratio.

Quench boiler . . . After cracking, the hot vapors enter the quench boiler where high-pressure steam is generated. The vapors are quenched to 400°-500° F., thereby generating substantially all of the steam required for cracking. From the quench boiler the hydrocarbon and steam flow to the fractionator tower. In the fractionator 400° F. end-point gasoline and lighter material is taken overhead. Heavier material is taken off the bottom to be used as fuel oil. The gas and liquid product overhead from the fractionator then flow to the compression system. The process steam used in the cracking is condensed in the overhead condensing system of the fractionator tower. The condensate is stripped of hydrocarbons by a small amount of low-pressure steam.

. . . Ethylene Separation

Fig. 3 represents the butane fractionation and gas-purification section of the plant. The liquid from the compression system is pumped into the debutanizer where debutanized gasoline and butylene-butadiene products are prepared. A small quantity of propane and lighter hydrocarbons entering with the feed are taken as an overhead product and recycled back to the compression system. The raw gasoline produced at this point is a highly aromatic and highly unsaturated product. Its properties are dependent on the depth of cracking. The octane number of the gasoline lies in the range 70-80 C.F.R.-M. clear. This gasoline has a high gum content and requires treating before blending into motor gasoline.

Butylene-butadiene . . . This product contains less than 5.0 per cent of butanes and 20-50 per cent butadiene depending on the conditions of cracking. Because of its unusual composition this product is also interesting for the production of chemical derivatives.

Flash gas from the high-pressure separator in the compression system flows to the caustic scrubbers where the H_2S is removed and then into a water scrubber to remove any entrained caustic. The gas following sulfur removal passes through alumina driers and is dried to a dew point of —30° to —40° F. at operating pressure. The gas from the driers then flows to the acetylene removal system where the acetylene concentration is reduced to 50-60 p.p.m. The gas is then cooled and fractionated in a depropanizer tower to remove butylenes.

Acetylene conversion . . . The details of this step are shown in Fig. 4. Acetylene formed in the cracking is selectively hydrogenated so as to later produce ethylene and propylene products of low acetylene contents. The operation is carried out catalytically under pressure with the hydrogen contained in the process gas accomplishing the hydrogenation. The process gas from the drier is first heated by exchange and then by steam to the range 300°-400° F. before entering the acetylene converter. The gas flows through the two converters and intermediate cooler in series. Leaving the final converter the gas is cooled by exchange, water, and refrigerant before entering the depropanizer.

The acetylene converters contain several catalyst beds. Temperatures are maintained by quenching between beds with recycled, cold, treated gas. Temperature control is essential to maintain selectivity in the hydrogenation of the acetylene and the mono-olefins. Equipment is provided for the initial reduction and subsequent regeneration of the catalyst with hydrogen.

Low temperature gas fractionation . . . Fig. 5 shows the flow through the five towers of the low-temperature gas-fractionation train. The propane and lighter material is separated into tail gas (methane, and hydrogen with 1.3 per cent ethylene to satisfy the dew-point requirements of the gas), ethane product, ethylene product containing 99.8-99.9 per cent ethylene, and propylene product. Two small recycle streams are produced from the ethylene topping still overhead and the ethylene tailing still bottoms.

Demethanizer . . . The demethanizing column is the heart of this recovery process and it is here that the plant differs from other ethylene-recovery plants. The demethanizer is operated at low pressure in the region of 100-150 psi. The feed is chilled to —150° F. and the reflux is condensed at —200° to —210° F. Operating experience has revealed no difficulty with ice formation in this tower. The feed chillers are duplicated and are switched every 2 to 3 weeks as necessary when pressure drop builds up across them. Very little reflux is required on the demethanizer, the molal reflux ratio being about 0.24 to 1.

Deethanizer . . . It is of particular interest to note that the propylene product made as a bottoms stream from the deethanizer contains 93-97 per cent propylene. This is another feature of the cracking process showing its high selectivity for olefin production. The propylene product is particularly suitable for chemical derivatives production at high efficiency and does not require any fractionation between propylene and propane.

(Continued on page 97)

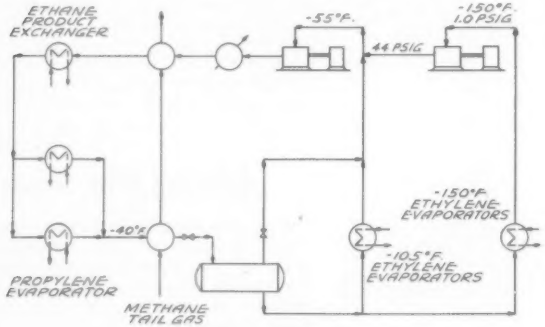


Fig. 7—Ethylene refrigeration system.

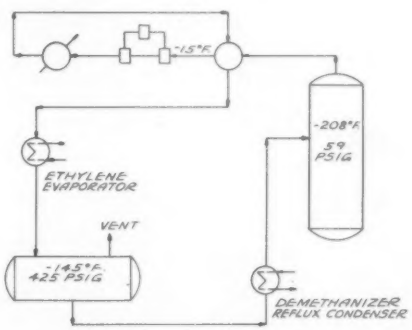
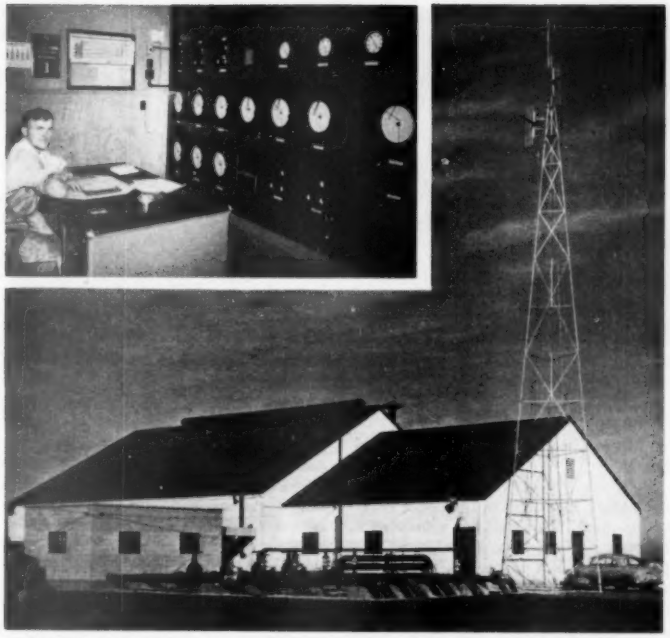


Fig. 8—Methane refrigeration system.



PROCESSING PLANT and Gate station equipment. Control runs are in foreground. Control regulators are located in the concrete-block building. In background is the building which houses plant equipment, office, etc. Main radio tower is at right. (Insert) View of control panel located in office of plant. Operator Dave Hiebert at desk.

GAS PROCESSING IN CANADA

Edmonton Plant Utilizes Gas From Alberta's Leduc Field

Processing plant has initial capacity of 10 million cubic feet per day of the oil-field gas-air mixture

by M. E. Stewart*

A NATURAL-GAS plant of a type entirely new to the industry in western Canada was put into operation on the outskirts of the city of Edmonton, last year. The necessity of this plant goes back 4 years to the time when crude oil was discovered near the town of Leduc, southwest of Edmonton. With the rapid development of Leduc oil field, substantial quantities of gas were produced with the oil and it was considered most essential that this gas be utilized. Imperial Oil, Ltd., the major operator in this oil field, planned and built a gas-gathering system and constructed a natural-gas conservation plant near the town of Devon. This plant was designed to remove the marketable heavier hydrocarbons and leave a residue gas which was suitable as fuel.

Northwestern Utilities, Ltd., completed a contract with Imperial to purchase the residue gas from its conservation plant. Early in 1950 a 22-mile pipe line was constructed to connect this new source of supply to the Edmonton distribution system. Up until this time the entire supply for Northwestern had come from Viking-Kinsella gas field 90 miles southeast of the city.

*Technical assistant, Northwest Utilities, Ltd., Edmonton, Alta.

Imperial's plant at Devon was designed to process 24 million cubic feet of oil-field gas daily and Northwestern's pipe line is of adequate size to take this quantity.

The tying in of this new source of supply, however, created a number of problems. The majority of these were brought about by the difference between the chemical composition of the Leduc gas and the Viking-Kinsella gas. Calculations and tests indicated the two gases were not directly interchangeable. While substantial qualities of the Leduc gas could be delivered directly to the city of Edmonton power plant where it could be utilized without major modifications to equipment, there remained a sizable quantity which of necessity had to be modified before it could be distributed throughout the city of Edmonton.

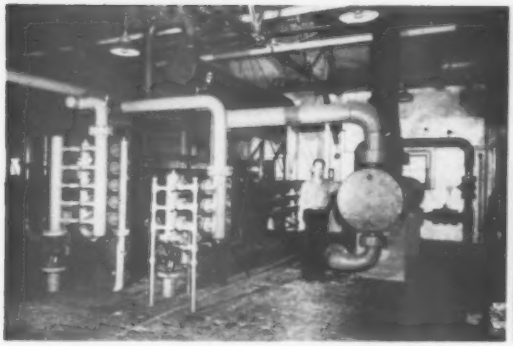
All Aspects Investigated

All aspects of the problem were thoroughly investigated and after these investigations were completed, it was decided to proceed with the construction of a processing plant which would modify the oil-field gas to the extent necessary to make it interchangeable with the company's major source of supply from Viking-Kinsella.

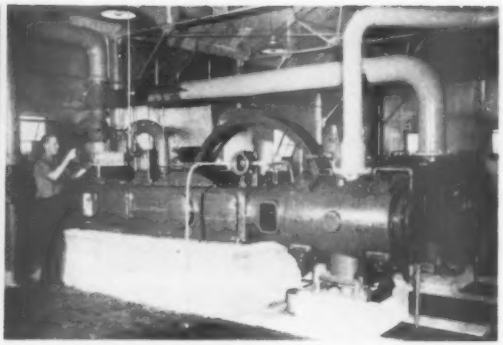
The quantity of residue gas available from Leduc is a function of the production of oil, with the result that substantially higher quantities of gas are available during the summer months. This of course, is the reverse to the heating-load pattern in western Canada. To date, quantities as high as 16 million cubic feet per day have been available during the summer period while average receipts during the winter months are approximately 9 to 10 million cubic feet daily. On an annual basis Leduc oil field will supply nearly 20 per cent of Northwestern's total system requirements but on a system peak day Leduc field will contribute only about 6 per cent of the total demand.

The major problem was that of utilizing the oil-field gas in the many thousands of appliances which are adjusted for burning Viking-Kinsella gas. It was not practical to continually adjust the numerous heaters, ranges, refrigerators, and other appliances to take care of the hourly and daily variations which would occur if oil-field gas was delivered directly to the Edmonton distribution system.

To circumvent these difficulties, it was decided to premix air with the high-B.t.u. gas, reducing the heating value to an interchangeable level. The air required is compressed by a reciprocating, gas-expander unit. Basically this unit, a 300-hp. Ingersoll-Rand com-



Heat exchangers required for cooling and for preheating. From left to right—air intercooler, air aftercooler, steam preheater, jacket water cooler, and gas superheater.



View of 300-hp. gas expander air compressor. Operator Tennant is shown refilling one of the McCord lubricators on the drive end of the compressor.

pressor, is a steam engine, with gas replacing steam as motive power. It is believed this is the first such application for this service in North America.

The plant is designed to operate over a range of outside air temperatures of −57° to +99° F. This range of suction air temperature requires varying the temperature of the gas to the expander so that sufficient power will be available to compress the quantity of air required for mixing. At −57° F. an inlet-gas temperature of approximately 150° F. is required, while at 99° F. outside temperature an inlet-gas temperature of about 275° F. is necessary.

Rich gas enters the plant at a temperature between 20° and 55° F. depending on the season, therefore it is necessary to give it considerable preheat. Part of this preheat is obtained by passing the gas in parallel through the intercooler, aftercooler, and jacket-water cooler.

The water separators on the intercooler and aftercooler are equipped with temperature bypasses—when the temperature of the compressed air out of the heat exchanger reaches a low of 42° F. this bypass opens, cutting down the quantity of gas passing through the heat exchanger. If this were not done, the separators would freeze off in the winter when the temperature of the incoming gas is below freezing. No bypass is required around the jacket-water cooler because the jacket-water is a 50-50 solution of glycol and water.

Gas Further Preheated

When rich gas has passed through the intercooler, aftercooler, and jacket-water cooler, it is further preheated in a steam heat exchanger. On leaving this exchanger, the gas temperature is in the neighborhood of 200° F. and in winter no further heating is required. In summer, however, the gas is further heated in a hot-air superheater.

A blower, powered by a 30-hp. electric motor, is located in the boiler room of the plant. This unit has a maximum capacity of 440,000 standard cubic feet per hour and a discharge velocity of 1,750 ft. per minute. Air is blown past a 3.5-million B.t.u. per hour burner and ducted to the superheater exchanger.

The rate of fuel feed to the above burner, and hence the final inlet-gas temperature to the engine, is determined by a two-bulb temperature controller. The two bulbs are an outside air and gas in the engine inlet. This instrument is preset to keep a desired ratio between outside-air temperature and engine inlet-gas temperature.

In addition to giving the gas the necessary amount of preheat the pressure at which it enters the drive cylinders of the compressor is regulated to approximately 200 psi. This is accomplished by a pilot-operated regulator at the plant inlet. A small bypass regulator acts as a trim on this pressure, bypassing some of the gas around the compressor if the inlet pressure is tending to rise.

The expanded gas from the compressor is put through a pulsation bottle, then measured before air is injected and transported to the control run. This premixing measurement is subtracted from the modified gas measurement to obtain a quantitative measure of the air added to the gas.

The required air is compressed in two stages from atmospheric to 90 psig. It is not preheated but is drawn into the first stage at outside temperature. Between stages it is passed through an intercooler and after the second stage through an aftercooler. It is then transported to a set of air receiver tanks and from them to the mixing run.

Mixing control equipment consists primarily of three control valves, an Askania ratio-controller and a Cutler-Hammer Calorimixer and calorimeter control system. The three control valves are: a hand-controlled butterfly valve in the gas run, a hydraulically operated ratio valve in the air run, and an electrically powered trimming valve also in the air run.

The two control runs are so sized that if an equal differential exists across the butterfly valve in the gas line and the electrical valve in the air line the resultant mix will be close to that required. Therefore the Askania controller is set so that a change of quantity through one of the runs (and therefore a change in differential across the control valve) will cause the piston-operated valve to move to a position in which the differentials will again be the same.

In principle the Askania instrument consists of an oil jet which is forced under pressure against two orifices, one leading to each side of the piston-operated valve. A change in either the gas or air differential will deflect the oil jet so that the pressure is increased in one of the two orifices and a movement of the valve results.

Final control is accomplished by means of a Calorimixer-actuated electric-motored valve in the air line. A sample of the plant product is burned in the Calorimixer and the valve moved electrically to change this reading if it is high or low. The control point is preset and is checked by burning the same sample in a calorimeter and recording this reading on a recorder. The calorimeter and calorimixer can be electrically linked so that the calorimeter will keep the Calorimixer on the set point.

Sufficient air is injected into the oil-field gas to make it interchangeable with the Viking-Kinsella supply. This addition of air reduces the heating

value to 980 B.t.u.'s per cu. ft., which is slightly higher than the heating value of the Viking-Kinsella gas. The control equipment is sufficiently sensitive to maintain the set value within plus or minus 1 B.t.u.

The modified gas, or plant product, is measured and taken to a mixing header where it is mixed with the quantity of Viking-Kinsella gas necessary to meet the demand of the city of Edmonton. The intermixed gases are then delivered to the city.

As the percentage of Leduc gas in the whole intermixture of Leduc and Viking-Kinsella increases toward the maximum of 100 per cent the heating value must be allowed to increase to compensate for the higher specific gravity of the Leduc gas. This condition occurs in the summer on week ends when the Leduc gas available is enough to supply the entire demand. When this condition arises it is necessary to reset the Calorimixer to a higher value, or if the period is short the change can be made manually.

The processing plant has an initial capacity of approximately 10,000,000 cu. ft. per day of the oil field gas-air mixture. Some of the equipment such as the boiler, superheater, and controls is sized to take a second 300-hp. compressor. This second unit is being installed to process the increasing quantities of Leduc gas which are becoming available.

The mixing plant was designed for Northwestern Utilities by Stone & Webster Engineering Corp. and constructed by local contractors at an approximate cost of $270,000.

Ethylene From Naphtha

(Continued from page 94)

Ethylene fractionation . . . The ethylene stream from the top of the primary ethylene fractionator contains 98.5 per cent ethylene. This product would be suitable for many applications and in this case the last two towers would not be required. For those applications where a product of 99.5 per cent or higher purity is required, the last two columns serve to perform the cleanup of product from methane and ethane.

. . . Refrigeration System

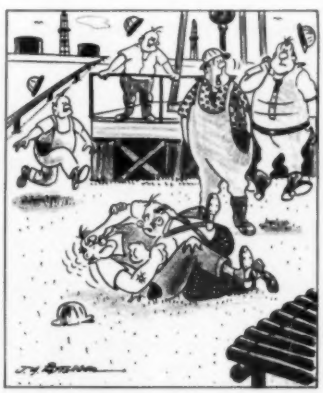
Refrigeration is recovered in the ethylene refrigeration system from both the tail gas and ethane product before they are discharged into the fuel-gas system. Methane is used as refrigerant in the other reflux condensers shown in this flow sheet.

No reflux pumps are used throughout this section of the plant. Gravity runback of reflux was used on all towers to avoid any possibility of product contamination with gland oil from reflux pumps or loss of product through seals. At the lowest temperatures used in this plant, there are no known pumps in satisfactory commercial operation.

Propylene refrigeration . . . Fig. 6 shows the flow through the propylene refrigeration system. The refrigerant at —48° F. flows from the evaporator to the compressor entering at approximately 1 psig. The gas from the compressor is condensed with water and then subcooled by using it as a source of heat in one of the reboilers. Leaving the subcooler the liquid flows to the flash drum from which the flash liquid flows to the evaporators. The flash gas returns to the compressor entering between the wheels at the appropriate point in the compressor.

Propylene is used as a refrigerant since it is available as a product from the plant. In areas of high utility costs, an ammonia absorption refrigeration system may be substituted for the propylene system. It is possible to derive all of the heat required to operate an ammonia absorption unit from the condensing overhead vapors of the fractionator tower in the pyrolysis section. Although the capital cost of an ammonia absorption unit will be higher than the compression refrigeration, this first cost is offset by the reduced operating costs in areas of high steam and power costs.

Ethylene refrigeration . . . Fig. 7 shows the flow through the ethylene refrigeration system. Ethylene is used as a refrigerant at two levels at —150° F. and about —105° F. This ethylene is used for dementhanizer feed chilling, reflux condensing and methane refrigerant condensing. The compression takes place in two centrifugal compressors. The —150° F. ethylene from the low stage evaporator enters the low stage compressor at about 1.0 psig. The discharge gas from the first compressor is mixed with the ethylene from the high level evaporator and the gas from the flash drum and the combined stream enters the high stage compressor at about 43 psig. and —55° F. The discharge gas from the second compressor is cooled first with water, then by exchange with tail gas and ethane product. The resulting 55°-60° F. ethylene is then condensed in various reboilers and by propylene. The liquid ethylene leaving the condenser is subcooled by exchange with tail gas. The subcooled ethylene is then flashed before flowing to the evaporators.



". . . and on the other hand, there's days they get along just swell."

Methane refrigeration . . . Fig. 8 shows the flow through the methane refrigeration system. This refrigerant is used only in the demethanizer reflux condenser. The methane refrigeration system is small in relation to the other refrigeration systems and in most plants the flow of refrigerant is not large enough to permit the use of a centrifugal compressor. Therefore, it is necessary to heat the methane gas before it enters the compressor. This methane is heated by exchange with compressor discharge to about —15° F. Leaving the compressor the methane is first cooled with water and then by exchange before being condensed in the ethylene evaporator. The —145° F. methane liquid then flows to the evaporator. Methane for refrigerant can either be obtained from natural gas if it is available or can be made from the demethanizer tail gas. If the latter source of gas is used additional small equipment is required to purge hydrogen and ethylene from the refrigerant makeup.

BOOK

VOLUMETRIC AND PHASE BEHAVIOR OF OIL-FIELD HYDROCARBON SYSTEMS. By M. B. Standing. Published by Reinhold Publishing Corp., 330 West Forty-second Street, New York 36. 123 pp. $10.

This book collects into a single volume the widely scattered data on the behavior of hydrocarbon systems in petroleum reservoirs. To systematize discussions of phase behavior, complex hydrocarbon systems have been divided into three categories: gases, condensate systems, and dissolved-gas systems. Although primarily concerned with the composition and phase behavior of fluids, the book also discusses the physics of flow of oil and gas in reservoir rock. The book is designed both for the classroom and as a practical working companion for the practicing engineer. Measurements are made in the laboratory on samples of reservoir fluids and the application of laboratory data to field conditions are fully discussed. Three large charts, separately printed and designed for constant day-to-day use, enhance the value of the book.

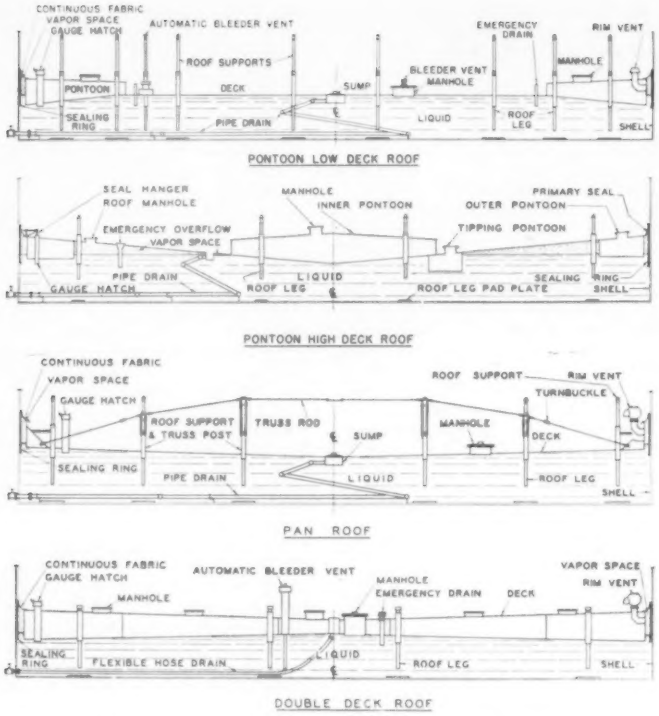


Fig. 1—Various types of roofs used for crude-oil working tanks.

- **Design,**
- **Construction,**
- **Operation, and**
- **Maintenance of . . .**

CRUDE-OIL WORKING TANKS

Selection of type of tank and foundation important; greatest maintenance problem is combating corrosion

by R. M. Carter*

AN important prerequisite for trouble-free operation and low maintenance of the crude-oil working tank is a well-built tank. Others are (1) proper selection of type and (2) inclusion of those design features specifically indicated for the service conditions anticipated.

Decisions on these matters will be the more sound when founded on actual experience, provided the experience is properly interpreted and correlated with the problem at hand.

The term working tanks refers to tanks at pumping stations in which the oil level is fluctuating most of the time due to filling, emptying, or absorbing variations in pumping rates. Accelerated internal corrosion rates, filling losses of vapors, and other differences in service conditions suggest certain conclusions for crude-oil working tanks that may not hold true for other storage tanks.

*Tank superintendent, Service Pipe Line Co. Presented at seventh annual petroleum mechanical engineering conference of A.S.M.E., Kansas City, Mo., September 24, 1952.

Tank Selection

When a pipe-line operation indicates that a tank of a given capacity should be provided, the problem arises of selecting a type of structure and accessories that will measure up to the service conditions imposed. The nature of the crude oil to be handled plays an important part in this selection, particularly the corrosive elements it may contain and its volatility.

Naturally, the selection should proceed by process of elimination from the cheaper to the more expensive. The conventional cone roof should, therefore, be considered before passing it up for the more expensive, but generally more suitable floating roof.

Cone-roof tank . . . A tank equipped with a fixed cone roof has several disadvantages for oil-pipe-line use. Among them are high evaporation losses from breathing and filling, and the possibility of undergoing severe damage from stresses accidentally imposed by even the slightest of pressure or vacuums. There is also the probability that a fire, once started, will end in complete destruction of the tank and contents.

There may be economic situations wherein the initial cash saving to be realized in choosing the cheapest tankage available may outweigh these objections—so long as sweet crude only is to be handled. But where sour hydrogen sulfide-bearing crudes are to be handled, or probably will be handled, is becomes practically imperative to select a floating roof of some kind if reasonable service life with minimum maintenance is to be obtained.

The presence of hydrogen sulfide in crude-oil vapor, even in low concentrations, causes very rapid corrosion of continually exposed steel surfaces. A tank with a fixed-position steel roof may have as much as one-third of its total internal surface area exposed to this corrosion, whereas an open-top tank with a floating roof usually has only the rimplate and sealing mechanism around the edge of the roof subject to attack. The amount of corrosion damage is, of course, proportional to the amount of area exposed. Surfaces wetted by the oil are not damaged by this kind of corrosion.

Corrosion failures . . . Pipe-line working tanks with steel cone roofs have failed within 3 years after being placed in sour-crude service. Failures are evidenced by pitting and general weakening of the top ring of the shell, roof-deck plates, and roof-supporting structure. Collapse of the roof is the ultimate result. The attack is more rapid on working tanks than on tanks used

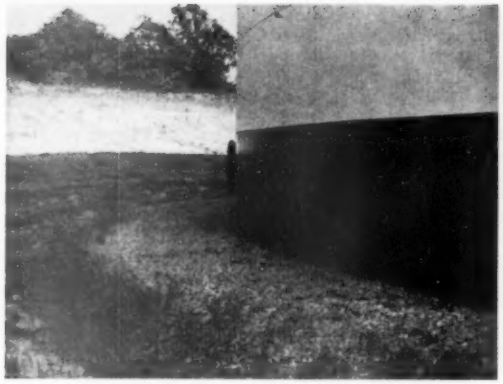


Fig. 2—Well-drained tank with crushed rock base.

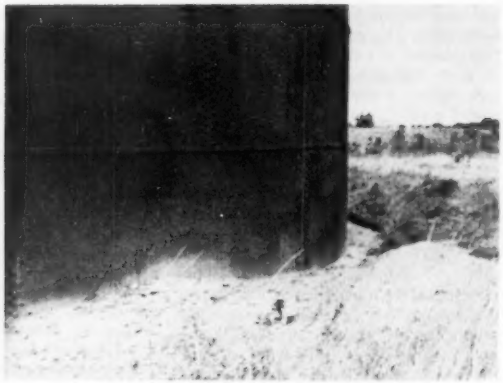


Fig. 3—Poor grade preparation is exemplified here.

to store crude, probably because frequent filling and emptying refreshes the hydrogen sulfide content and admits fresh moist air to accelerate corrosion.

If it becomes necessary to adapt an existing fixed-roof tank for sour-crude service, a protective-coating application on those internal areas exposed to vapors may be worthy of consideration. To date, however, such coatings have not proved very dependable. When building new tankage for sour service, it is better economy to invest in a floating roof than buy the cheaper cone roof and attempt to protest it with a coating.

Open-top tanks . . . If an open-top tank is decided upon, operations may be further benefitted by making a considered choice from the several general types of floating roofs available. The more common types are referred to as the "pan," "pontoon," and "double-deck." (See Fig. 1).

Of the three types, the double-deck has the greatest number of desirable features; also the highest cost. It is most likely to be suitable for any operating requirement that may develop. On the other hand, there are conditions under which the cheaper roofs may be expected to give satisfactory service, and consideration should be given to the initial cost saving afforded by their use.

If sour-crude service is anticipated, a floating roof should be of a type having a minimum of steel surface exposed to gas and a maximum area in contact with the oil in order to have

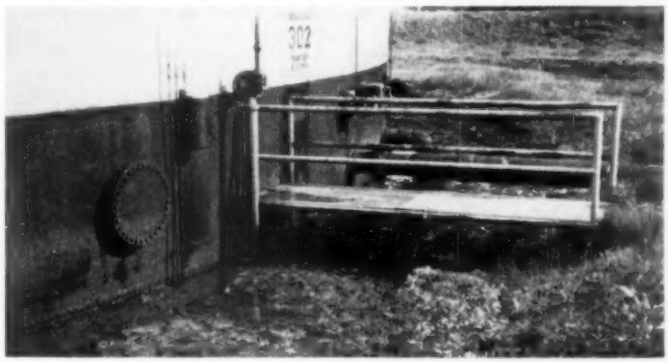


Fig. 5—Wet soil under the tank is the result of poorly drained earthen base.

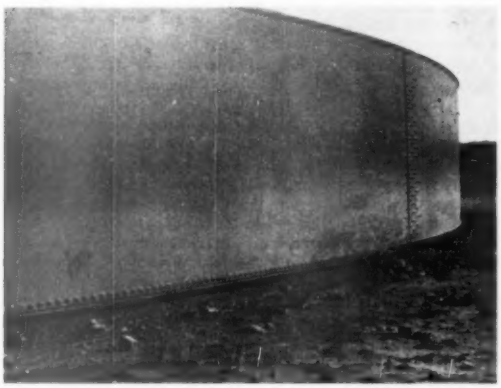


Fig. 4—Unprotected earthen bases for tanks erode badly in use.

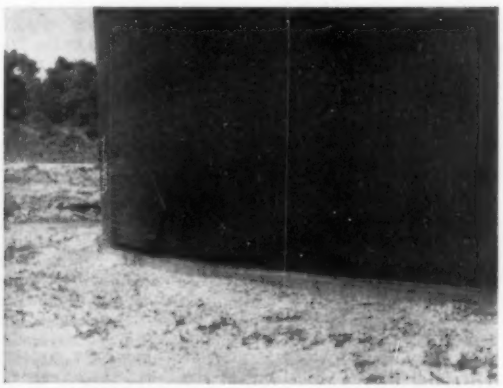


Fig. 6—A good foundation for the tank is exemplified by this concrete-ring installation.

the least trouble from hydrogen sulfide corrosion. The pan roof satisfies this requirement as well as the double-deck, as does also the pontoon roof of the type having a low deck in full contact with the oil.

The high-deck type of pontoon roof has a large under-deck area which rides out of the oil and, therefore, is exposed to hydrogen sulfide corrosion. This roof is not as desirable as the others for sour-crude service because of the difficulties encountered in maintaining coatings on the larger vapor-exposed areas. Experience has shown that the rate of corrosion is more rapid on horizontal surfaces exposed to vapors, such as the underneath side of this deck, than on the vertical areas of the rimplate.

Insulating properties . . . In the handling of crudes, or crude-casing head mixtures, having vapor pressures approaching the limit for atmospheric pressure tankage, the insulating properties of a roof become important. Passing lightly over a matter which in itself is a subject worthy of considerable study, suffice it to say here that the double-deck roof is the better structure in this respect.

If it becomes necessary to apply additional insulation, the weather-protected space between decks at least provides an ideal place to put it and permits the consideration of a greater variety of insulating materials. The pontoon roof also has inherent insulating qualities, while the pan has practically none and is difficult to insulate in a serviceable manner.

A frequently voiced objection to pan roofs is lack of stability under water and snow loads. Actual experience in operating 70 pan-type roofs without any of them ever having been sunk in the oil, even though 17 of them were in service as far back as 1931, would indicate that this inherent fault can be coped with and need not stand in the way of their selection if other factors are favorable. Recent design changes improving the general appearance and facilitating maintenance, coupled with the economies of cheaper construction, have made the pan-type roof very attractive.

Rimplates on Sour-Crude Tanks

Although a floating roof of an appropriate design is immune to an extensive attack by hydrogen sulfide corrosion, it may still have some vulnerable points of minor nature that require special attention. Among them are the outer rim of the roof and the parts which make up the sealing-ring mechanism; in other words, all surfaces that are exposed to gas in the annular space enclosed by the continuous seal fabric between the sealing-ring shoes and the vertical rimplate of the roof proper. On a 120-ft.-diameter tank the rimplate has an exposed area of some 900 sq. ft.

It has been suggested that the rimplate be made of nonferrous metal or corrosion-resistant steel. Actual service experience indicates that the use of slightly heavier steel plate, 5/16 or ¼ in. instead of the usual 3/16 in. will adequately strengthen this part at little added expense and without complicating erection methods.

Corrosion protection . . . The continued use of steel plate in the rim should be accompanied, however, by good maintenance practices. The vapor-exposed surface should receive a protective coating at the time interior coatings are applied to other parts of the tank. It is essential also that the continuous seal fabric be kept in good repair to keep fresh, moist air out of the annular gas space. Corrosion has been found to be accelerated in the vicinity of breaks in the fabric.

Galvanizing has proved to be a practical and effective method of protecting the sealing ring sections or shoes. Small parts such as hangers, linkage, brackets, etc., should either be galvanized or made of heavier than usual stock to offset corrosion. Small pivot pins and cotter keys should be made of stainless steel. Some sealing-ring designs have mechanisms located in the gas space under the seal. If the mechanical parts thus exposed to sour gas are treated according to the foregoing suggestion, corrosion damage should not be severe enough to stand in the way of acceptance of the design.

Cleanout Doors

At one time or another during the life of an oil tank it probably will be necessary to thoroughly clean the bottom and eliminate explosive vapors so that welded repair, interior coating, or alteration work can be performed. Changes in the grade of crude handled and loss of working space may also necessitate internal cleaning.

In the older tanks of riveted construction, access to the interiors is readily obtained by removing one of the lower shell sheets, the joints of which may be parted safely by cutting the rivets with an air-driven chisel. This provides a large opening nearly flush with the bottom through which the heavy bottom settlings may be removed without interfering with the dragging method commonly used.

The welded shell in modern construction presents a problem in providing a satisfactory cleanout opening. The removal of a shell sheet by flame cutting is, of course, impossible prior to cleaning; furthermore, rewelding of shell sections should be kept to a minimum to avoid distortion stresses. In the early forties, an attempt was made to solve the problem through the use of a cover plate bolted to a square, framed opening in the shell, fabricated of flat plate sections with welded joints and sharp corners.

Faults in this device were eventually brought to light by a failure resulting in complete destruction of a 90,000-bbl. tank and its contents. The severity of this accident, which attracted industry-wide attention, naturally resulted in a more cautious attitude toward bolted cleanout doors of any sort. The fact remains that there is a definite need for a removable cleanout door for welded tanks, particularly one with the opening flush with the bottom, and it is hoped that an improved design may be proved worthy of general acceptance. New designs developed by the major tank companies are now under consideration by the American Petroleum Institute.

Bottom Sumps

Development of a bottom-sump design usually includes sloping the bottom to the sump for drainage, connecting the suction and filling lines directly to the sump, and leading them out from under the tank below the bottom plates. If the tank is to have a floating roof, some sort of arrangement is also necessary for the roof to be operated to the extreme low position in contact with the bottom.

The objectives are: (1) use of the full capacity of the tank as working space, and (2) prevention of b.s. and w. accumulation. Although the objectives are very worthy, this route of approach to them should be taken only after thorough consideration is given to the operating and maintenance characteristics involved. Otherwise, one may end up with a facility that is a liability instead of an asset, or does not serve its intended purpose.

Working space . . . As to the working-space consideration in a tank feeding the main-line pumps, it is impracticable to draw the oil level down below the minimum head that will move oil through the suction line system and fill the pumps at the rates demanded by the pumping schedule. When the minimum head pressure is reached, it is necessary to switch to a fuller tank as reduction to a lower pumping rate usually is not desirable, particularly since the primary objective is operation at full line capacity.

Minimum working levels lower than 3 or 4 ft. ar rather uncommon under conditions prevailing on large-capacity pipe lines. Even when favored with a high tank-grade elevation, or using booster pumps in the suction line, a

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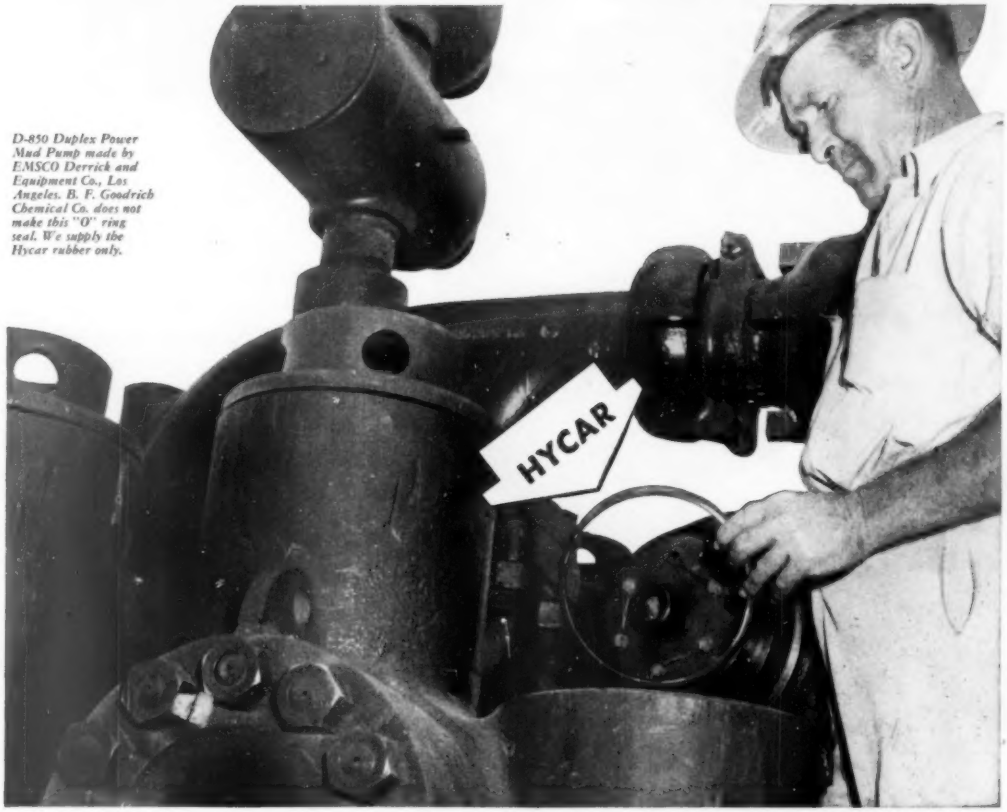

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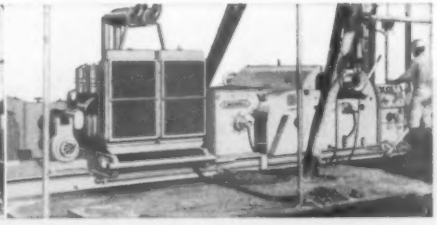
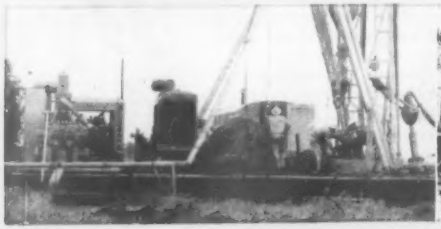
Model O, two- or three-engine draw works for 10,000-foot drilling or 15,000-foot workover.



Model D, with single-, twin-engine or two separate engines for 5,000-foot drilling or 10,000-foot workover.

Model S, single-engine draw works for 4,500-foot drilling or 10,000-foot workover.



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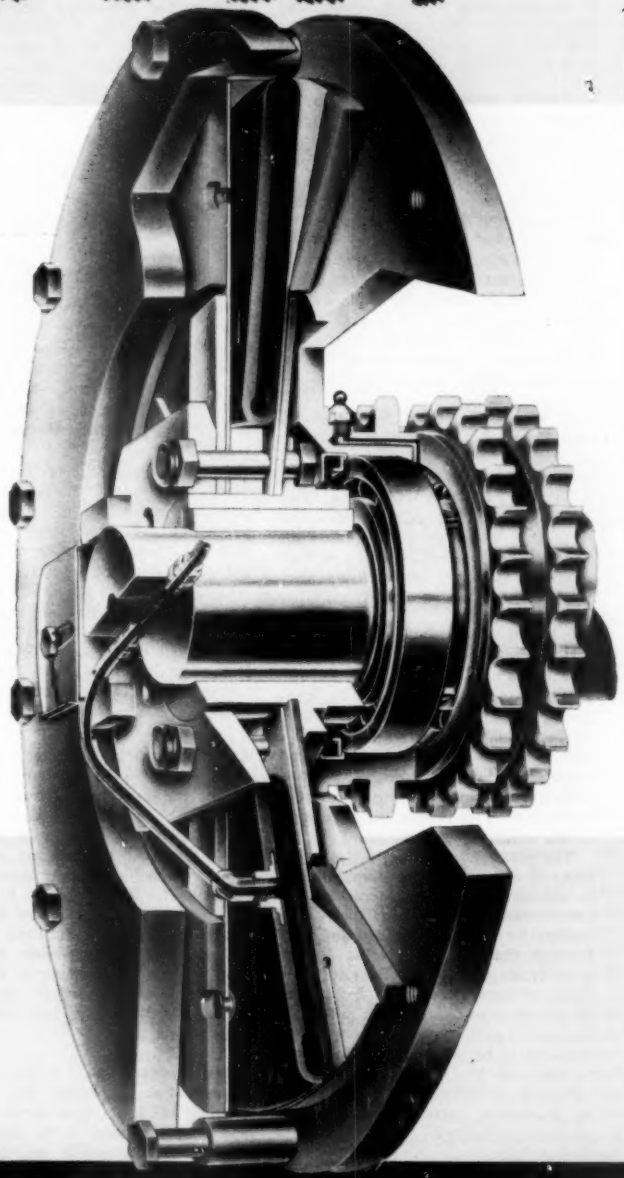
Incomplete engagement or incomplete release of clutch plates are usually the real reasons for trouble with friction clutches. Both conditions are traceable to foreign material lodged in the gear teeth of gear-type clutches, or to improper adjustment when clutches are designed to be adjusted manually.



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minimum level of 2 ft. may be difficult to obtain due to cavitation, line restrictions, etc. Unless a spare pumpdown unit is available, or its use justified, to continue reducing the tank at a low rate, the oil left below the working level will remain in dead storage.

It follows then that before attempting to convert the extreme lower levels of a tank into working space, one should check related facilities to ascertain that the space would be used as such if available.

B.s. and w. accumulation . . . Effective control of b.s. and w. accumulation is, of course, a major problem in pipe line operations. But it is the b.s. which builds up into the working space of a tank that is of the greatest concern. B.s. occupying the normally dead space in the extreme lower levels of a working tank is of less concern; there is little need to remove it except infrequently to thoroughly clean the tank for repair, retirement, or to change to an entirely different grade of crude, such as from a sour to a sweet crude or from a paraffin-base to an asphalt-base crude.

In fact, bottom settlings appear to have been beneficial in some instances by sealing off holes developed from bottom-side corrosion and acting as a buffer against internal corrosion. Topside corrosion of uncoated bottom steel is usually worse in areas continually swept clean by the incoming stream.

Where the minimum working level, as previously defined, is 2 ft. or more above the bottom, practical b.s. control can be obtained by using a rigid suction line with its inlet end turned downward or terminating in a vortex chamber, and accompanied by some sort of a liquid agitating device to keep the b.s. leveled off at the height of the suction inlet. Agitation can be accomplished with a motor-driven propeller-type mixer, or under certain conditions with a jet system using the force of the incoming stream.

The greatest task in maintaining oil tanks is to combat corrosion, internal as well as external. With conventional construction a fair job of preventing bottom leaks can be accomplished through the use of galvanic anodes, good drainage of the grade, and application of bottom coatings. Installation of bottom sumps and lines under the bottoms would certainly increase the obstacles to be overcome in this battle because of the inaccessible surfaces subject to corrosion on which it would be practically impossible to maintain protective coatings.

Tank grades . . . The effort required to obtain and maintain a properly designed and well-constructed grade for a tank will pay big dividends throughout the years in operating problems avoided. Such a grade is expected to provide a uniformly level and stable surface on which the erector can build a truly round, level, and plumb tank. It is expected to offer reasonable assurance that the completed tank will continue to be supported in its original shape, that normal settlement will be uniform and minimized, and that the underneath surfaces of the tank bottom will be kept dry to mitigate bottom-side corrosion. Soil conditions and the lay of the land may determine the amount of effort required to accomplish these things.

Obtaining good drainage at the start is usually a routine job of grading the ground around the tank site; also avoiding the ancient practice of cutting the grade below the surrounding terrain in order to supply dirt for the firewall. In conjunction with a suitable means of disposing of surface water, a uniform pad of crushed stone six inches thick placed on the tank base proper will suffice to keep the bottom steel dry by aerating it and preventing the capillary attraction of moisture. Figs. 2 and 3 are typical examples of good and poor grade preparation for proper drainage.

For the smaller tanks up to 80 ft. in diameter by 40 ft. high built on ordinary soils, a well-graded base padded with crushed stone will probably be adequate. In some instances the same type of base may also be adequate for tanks up to 120 ft. diameter by 56 ft. high where naturally compact soils are encountered in a dry climate, such as in West Texas. But generally, it is good practice to add a concrete ring to the base of the larger tanks.

Concrete rings . . . There is a wide variety of applications for concrete rings, ranging from those locations where tanks definitely could not be built and operated without them, to those where soil conditions are good but construction and maintenance could be helped materially by adding the rings. At the low end of the range where the worst conditions prevail, the ring design must follow the common practice of designing to withstand ultimate bending stresses and hoop stresses calculated on the assumption the soil is a fluid.

Other advantages . . . It has been observed when inspecting the interiors of many old tanks, even those on good soil, that the outer 2 ft. around the edge of the bottom is usually sloped sharply downward. The lower edge of the shell, or chime angle, may be 4 to 5 in. lower than the average bottom elevation, thus placing unnatural stresses in the bottom and shell plates.

Settlement of the shell below the bottom level in such cases is caused by the concentrated weight of the shell coupled with one or more of three things acting on the soil supporting it: (1) erosion by wind and water; (2) alternate freezing and thawing; and (3) alternate wet and dry conditions. Each time the top layer of soil is softened by thawing or soaking, a little of it is squeezed out from under the edge of the tank. Several years may be required to develop the observed condition.

The fact that the bottoms usually are nearly at their original level, except for having been pulled down around the edge by the weight of shell, indicates that the soils are able to support the oil loads with no appreciable lateral displacement, but need a little help in supporting the shell loads. Figs. 4 and 5 show soil erosion and wet soil conditions which contribute to tank settling.

New installation . . . In considering a new installation subject to similar conditions, it becomes obvious that what is needed most is to substitute a solid material such as concrete in the perimeter of the base to prevent erosion and retain firmness there when thawing or wet. Furthermore, the soil pressure under the shell should be reduced and in doing so, it is advisable to design for a uniform pressure over the entire base, with the concrete ring considered as an integral part of the tank.

As an example, for a 120-ft.-diameter by 56-ft.-high open-top tank having a shell weight of about 1,400 lb. per ft. of circumference and a maximum oil load of about 2,800 lb. per sq. ft., a concrete ring 1 ft. wide with the shell resting on the center of the section would produce for all practical purposes the balanced loading condition desired. A depth of 12 to 18 in. of concrete should be adequate. Fig. 6 shows a concrete ring installed under a 167,000-bbl. tank.

Easy erection . . . A concrete ring can be poured and finished off accurately enough to provide a true plane surface on which to erect the tank shell without resorting to shims for leveling the first ring. Furthermore, the base will stay level as the erection progresses from ring to ring, thereby avoiding the necessity of releveling during construction as is so often the case without rings. This feature is important to the erector in his effort to produce the best possible job, which in turn is most important to the user because a well-built tank is one of the first prerequisites to trouble-free operation.

Here's a new method of

Inhibiting Corrosive Wells

by J. R. Marshall*

THERE are several methods in use for injecting corrosion inhibitor into wells, each with its relative advantages. Criteria of any good method of injection are: (1) It must give inhibition to the entire equipment, (2) it must be under constant control of the operator, (3) it must not interrupt production, (4) costs must be competitive with other methods, and (5) the procedure must be a comparatively safe operation.

For two principal reasons the injection method of well-corrosion inhibiting was taken under advisement at Erath Unit, Erath, La. These reasons are: 1, Wells in the liquid-in-place reservoirs were increasing in their extent of corrosiveness because of increase in salt water, rendering sand production and use of solid-stick type inhibitor no longer adequate. 2. The method used in those corrosive wells in the gas-in-place reservoirs required an intermediate protective liner, as a safety factor, between the tubing which was perforated and the long casing. This 5-in. diameter protective liner is in very short supply and could be used elsewhere making possible completion of additional wells.

It was believed that the problem could be surmounted if a system of valves could be devised so that a small, continuous, controlled flow of inhibitor could be injected into the production, through a port near the bottom of the tubing, while the annular space between tubing and casing was completely filled with a liquid to keep bottom-hole pressure off of the top of the casing. After discussing the valve system with equipment concerns, Macco Oil Tool Co., of Houston, constructed a spring-loaded valve in series with two check valves mounted on the outside of a pup joint of tubing. The device is arranged that when pressure is applied to the hydrostatic head in the annular space, sufficient to overcome the spring setting, inhibitor will flow through the port in the pup joint.

Recently a retrievable-type arrangement was devised by Otis Pressure Control Corp., which was mounted inside the tubing at a check valve inserted in a side wall perforation. This check valve prevents loss of inhibitor when the injection valve is not in place. Using either equipment, each of which has certain advantages, the criteria previously set forth are accomplished.

Installation procedure for the injection equipment is as follows:

During a workover the multiple-valve equipment is installed in the tubing string about two joints above the tubing-casing packer. The annular space is washed free of mud and filled with a mixture of 39 parts distillate, normally produced from that type of well, and 1 part liquid organic inhibitor. An injection pump, capable of injecting up to 80 gal. of the above mixture daily, is installed at the surface.

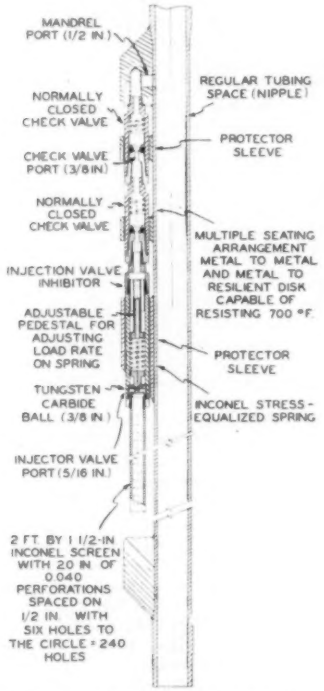
The liquid mixture is injected through a tee into the annular space, forcing an equal quantity of mixture through the multiple-valve equipment into the flow stream. The pressure maintained by the pump, in addition to the static head is sufficient to operate the spring valve at the bottom of the well.

On the other end of the tee is installed a bursting plate, set in the line to a flare, as a safety practice to prevent excess pressure being developed on the casing by the pump in case the valves at the bottom of the well fail to operate. The quantity of inhibitor mixture injected in each well and consequently into the flow stream, which can be regulated by the pump, is normally about 40 gal. of mixture per day. A tank capable of holding 500 gal. of the mixture is installed at the pump suction to reduce labor costs.

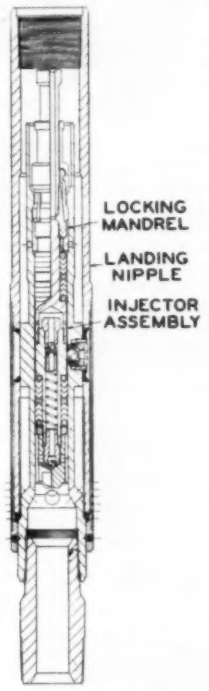
This installation was developed on Wells 41-1 and 32-4 at the Erath Unit in October and November 1951 respectively. With exception of a 1-week period with operational difficulties and another week during collection of samples for P.V.T. data, the equipment in Well 41-1 has operated continuously. Injection in Well 32-4 was interrupted to procure samples for P.V.T. data but operated satisfactorily until April 20, when the well was killed for workover purposes.

At present there are four injection-type valves in use at the Erath Unit, two of which are manufactured by the Macco Co. and installed in Wells 38-4 and 41-1, and two manufactured by the Otis Engineering Corp., which are installed in Wells 32-4 and 3-8. It is planned to install similar equipment in additional wells at the time of future workovers.

*Chief chemist, Erath Unit Operations (The Texas Co. operator) Erath, La.


MANDREL PORT (1/2 IN.)
REGULAR TUBING SPACE (NIPPLE)
NORMALLY CLOSED CHECK VALVE
PROTECTOR SLEEVE
CHECK VALVE PORT (3/8 IN.)
NORMALLY CLOSED CHECK VALVE
MULTIPLE SEATING ARRANGEMENT METAL TO METAL AND METAL TO RESILIENT DISK CAPABLE OF RESISTING 700 °F.
INJECTION VALVE INHIBITOR
ADJUSTABLE PEDESTAL FOR ADJUSTING LOAD RATE ON SPRING
PROTECTOR SLEEVE
TUNGSTEN CARBIDE BALL (3/8 IN.)
INCONEL STRESS-EQUALIZED SPRING
INJECTOR VALVE PORT (5/16 IN.)
2 FT. BY 1 1/2-IN. INCONEL SCREEN WITH 20 IN. OF 0.040 PERFORATIONS SPACED ON 1/2 IN. WITH SIX HOLES TO THE CIRCLE = 240 HOLES

Macco bottom-hole, chemical injector assembly.



Otis down-hole, chemical injector.

Design and Operation of Dehydrators . . .

for Volatile Hydrocarbons

Closed-system operation with solid desiccant requires no extraneous source of gas for desorption. Specific operation shows savings of $5.50 per day with units of this type.

by Layton Boyd*

IN many modern plants designed for high propane recovery, deethanization and demethanization are accomplished by prefractionation of the total oil stream. With this type of operation the product deethanizer is eliminated. Propane in this case would be an overhead product from the first fractionator. In plants where steam is used for stripping, the overhead propane will be saturated at the temperature existing in the reflux accumulator. In plants where dry or hydrocarbon stripping is used, occasional upsets in plant operation will leave sufficient residual moisture remaining in the oil entering the still to produce sufficient water in the depropanizer overhead to give a dew point higher than that permitted in L.P.G. specification.

Experience has shown that where propane is taken as a bottom product and would presumably be dry, upsets in plant operation have caused the propane storage frequently to turn up wet. It has also been found necessary to maintain liquid stream dew points considerably lower than that required by specifications due to the concentration of moisture in the vapor phase. As an illustration, the vapor phase of saturated propane at 100° F. will contain approximately seven times as much moisture by weight as the saturated liquid phase. This accounts for the fact that propane or other volatile hydrocarbons can be dehydrated by weathering. However, this method is believed to be both expensive and highly unsatisfactory.

One of the most commonly used methods of unloading propane cars is by compression. The compressor takes suction from storage-tank vapors and discharges into tank-car vapor outlet. By this method, moisture concentrated in the vapor phase of the storage tank is transferred to the vapor phase of the tank car.

It is obviously necessary to raise the temperature in the vapor phase in the tank car higher than the temperature of the liquid in the tank car before a pressure differential can be established between the tank car and storage vessel. This condition further encourages the migration of moisture from the liquid phase to the vapor phase. Due to these conditions liquid propane that meets moisture specifications in both sellers' and purchasers' storage can and does turn wet in the vapor phase of the tank car. In order to minimize this condition it is necessary to reduce the moisture content of the liquid well below that actually required by specifications. It is generally assumed that a dew point of minus 26° F. is equal to the cobalt-bromide test required by L.P.G. specifications.

*Chief engineer, Born Engineering Co., Tulsa. Presented at Western Petroleum Refiners Association meeting, El Dorado, Ark., October 1952.

Maintaining Dew Point

To maintain the desired minimum dew point and reduce the concentration in the vapor phase it is desirable to operate with dehydrator outlet dew points of minus 40° F. or lower. Dew points this low easily can be obtained with properly designed and operated dehydration equipment of the solid-desiccant type. There are a number of solid desiccants available that are satisfactory for this purpose.

In design of solid-desiccant dehydrators it is believed sufficient desiccant should be used to maintain the maximum adsorbed moisture content of the desiccant to not more than 5 per cent by weight. Experience has shown that better results will be obtained if the depth of the desiccant bed is kept at a minimum of 5 ft. Care must be taken to avoid the introduction of liquid water into the desiccant bed.

With some desiccants liquid water causes the immediate decomposition of the desiccant. To maintain high dew-point depression it is of course necessary to obtain as nearly as possible complete removal of adsorbed moisture from the desiccant on the desorption cycle.

Satisfactory desorption can be obtained by proper design and operation. Sufficient heat must be available and at sufficiently high temperature, to elevate the required amount of recycle vapors to a minimum of 400° F. A large percentage of the adsorbed moisture will be removed at a comparatively high pressure and at a temperature under 300° F. However, to obtain the desired desorption it is desirable to reduce the pressure at the end of the desorption cycle. This permits more complete desorption with resultant lower product dew points.

Provisions should also be made for cooling the desiccant bed to normal operating temperature before again placing on stream. Provision should also be made to prevent a too rapid reduction of pressure when taking dehydrator off stream to avoid damage to desiccant from particle breakup due to expanding gases. This condition is of course more troublesome at high pressures and can best be accomplished by installing a differential control valve controlling the differential across an orifice in the drawdown line. This permits automatic regulation of drawdown rate.

With the dehydrator shown in Fig.

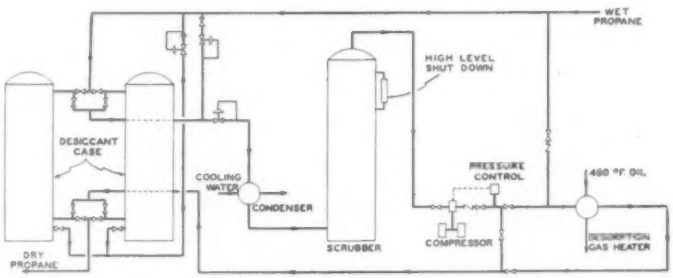


Fig. 1—Dehydration-plant flow layout.

l desorption is accomplished by recirculation of propane vapors heated to a temperature of 400° F. In operation of this dehydrator the first step is the withdrawal of the liquid propane from the desiccant case. This is accomplished by starting the compressor which introduce heated vapors into the desiccant which raises the temperature and subsequently the pressure sufficiently to permit the introduction of the liquid propane into the inlet of the onstream dehydrator.

After liquid propane has been removed, circulation of propane vapor is continued. Pressure on the desiccant case is reduced to approximately 100 psig. and circulation is continued until the inlet temperature starts to rise rapidly. At this time pressure is further reduced by venting to fuel to approximately 15 psig.

Speed Up Cooling

After desorption has been completed, the heater is shut off and bypassed. The pressure is again raised to 100-125 psi. and circulation continued until the outlet vapor from the desorption cycle approaches normal operating temperature.

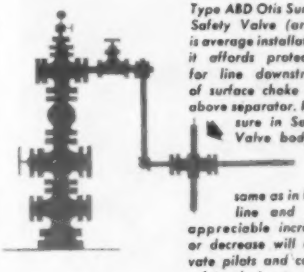
The moisture removed from the desiccant by circulated hot vapors is in turn removed from these vapors by cooling and condensing, after which the condensed water is collected in the compressor suction scrubber and withdrawn.

The dehydrator discussed here permits recovery of approximately 70 gal. of propane per cycle for a 1,000-bbl. per day unit or 210 gal. of propane. This propane would be worth approximately $2.90 based upon 1,000 B.t.u. natural gas at 15 cents per M.c.f. while as commercial propane at 4 cents per gallon the value would be approximately $8.40. The difference of $5.50 per day would pay out additional cost of the closed system dehydration unit in a very short time.

To obtain satisfactory operation of solid desiccant dehydration units particular attention should be given to the following.

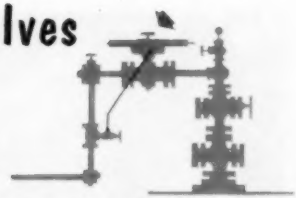
1. To obtain high dew point depression the desiccant must be properly desorbed during each desorption cycle.
2. The desiccant should be cooled to approximately operating temperature each time before placing on stream.
3. The product inlet temperature should be kept at design temperature.
4. The introduction of products containing hydrogen sulfide into desiccant cases should be avoided.
5. Each time a desiccant is opened to atmosphere it should be thoroughly purged and the outlet stream laboratory checked to avoid contamination.

Type AAM1 Otis Surface Safety Valve on flow wing of offshore well (arrow) is controlled by pressure in line (red) from Type M Otis Check Valve downstream of surface choke. This high-pressure well is one of many flowing to central separator platform, also offshore. Heavy marine traffic nearby seriously endangers the trees and flow lines. If damage occurs, the Otis Safety Valve will close in the well instantly and automatically until repairs can be made and the Safety Valve opened manually and reset.

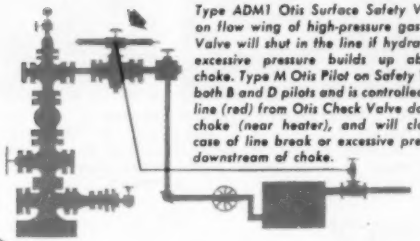


Type ABD Otis Surface Safety Valve (arrow) is average installation; it affords protection for line downstream of surface choke and above separator. Pressure in Safety Valve body is same as in flow line and any appreciable increase or decrease will activate pilots and cause safety device to shut in line automatically. No external connections are required on installations like this one.

Otis Type A Surface Safety Valves



Type AAH1 Otis Surface Safety Valve installation (arrow) similar to off-shore well described above uses Type H Otis Safety Valve Pilot because flow line pressure is only a fraction of pressure in well. Source of pressure to activate Safety Valve pilots is through operating line (red) from Type M Otis Check Valve to Type H Pilot. This well is protected from pressure variations either too high or too low from present limits. Check Valve prevents further flow into M Pilot after valve is closed, will also close if the outside pressure line is broken.



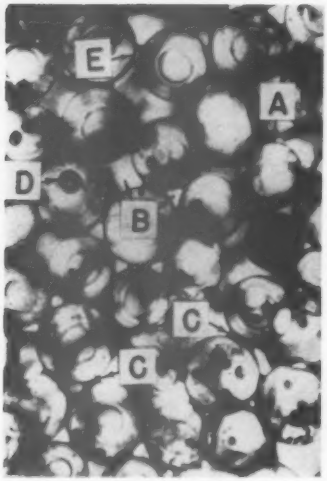
Type ADM1 Otis Surface Safety Valve (arrow) on flow wing of high-pressure gas well. Safety Valve will shut in the line if hydrates form and excessive pressure builds up above surface choke. Type M Otis Pilot on Safety Valve carries both B and D pilots and is controlled by pressure line (red) from Otis Check Valve downstream of choke (near heater), and will close valve in case of line break or excessive pressure in line downstream of choke.

OTIS PRESSURE CONTROL SERVICE EQUIPMENT

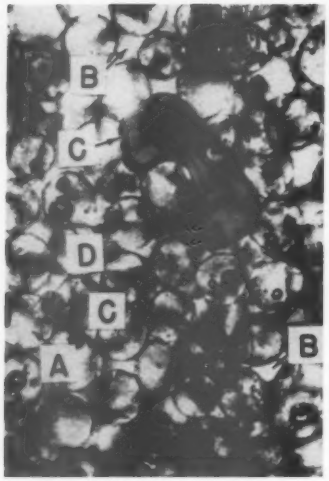
OTIS SAFETY VALVES

"Everything's Under Control"

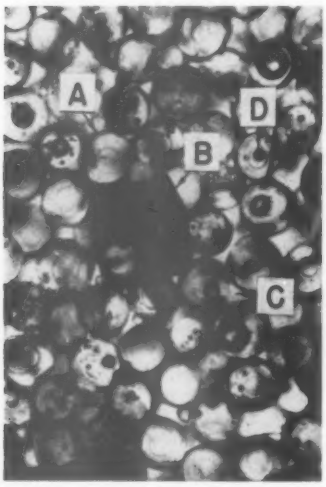
Complete details on these and other Otis Surface and Tubing Safety Valves may be obtained by contacting Otis Pressure Control, Inc., P. O. Box 7206, TWX DL-220, Dallas, Texas, or the Otis Office in Houston • Corpus Christi • Longview • Victoria • Falfurrias Odessa • New Iberia • Shreveport • Houma • Oklahoma City • Elk City • Authorized export dealer: Otis Pressure Control Export, Inc., Edmonton, Canada • Caracas, Venezuela



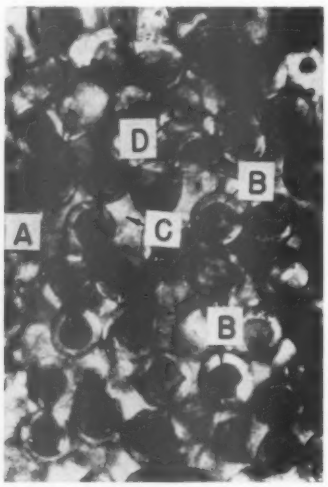
CONNATE WATER IN WATER-WET SYSTEM. (Fig. 1) A = glass spheres; B = oil phase; C = water phase, pendular rings; D = air bubbles inside glass spheres; E = consolidating material (silica).



CONNATE WATER IN OIL-WET SYSTEM. (Fig. 2) A = glass spheres; B = oil phase; C = water phase, discontinuous globules; D = air bubbles inside glass spheres.



RESIDUAL OIL IN WATER-WET SYSTEM (AFTER FLOODING). (Fig. 3) A = glass spheres; B = oil phase, discontinuous ganglia; C = water phase; D = air bubbles inside glass spheres.



RESIDUAL OIL IN OIL-WET SYSTEM (AFTER FLOODING). (Fig. 4) A = glass spheres; B = oil phase, continuous; C = water phase; D = air bubbles inside glass spheres.

IMPORTANCE OF

Wettability in Surface-Active Agent Water Flooding

by Thomas F. Moore* and Harold A. Blum*

Both experimental and theoretical evidence indicates that no increase in oil recovery should be expected from water-wet sands by use of surface-active agents. Some increase in oil recovery is possible in oil-wet systems, but the economics of the injection process using these agents is uncertain.

USE of surface-active agents to increase oil recovery in water flooding has been considered by several investigators.[1,2,3,4,5] In this study experiments were conducted to understand better the mechanism by which these agents function. This was done by both visual examination of idealized porous media with aid of a microscope, and flood studies on natural and synthetic core materials. While this work was limited to a few porous media and surface-active agents, it is believed that the concepts presented are generally applicable.

It was concluded as a result of this work that little or no additional recovery could be realized by the use of surface-active agents in water-wet reservoirs. On the other hand, in oil-wet rocks, it was found that additional recovery of oil may be possible using surface active agents in the flooding water although it is not certain whether this would be economical.

No consideration was given to the possible benefits that might accrue from using surface-active agents to increase the injection rates, to kill bacteria in flood water, or to trace injected water.

Mechanism of Water Flooding With Surface-Active Agents

As an integral part of any discussion of the merits of surface-active agents in water flooding, a distinction must be made between water-wet and oil-wet systems. A water-wet system is defined as one in which the advancing water contact angle (measured in the water) against oil is less than 90°. An oil-wet system is one in which the advancing water contact angle is greater than 90°. These systems are illustrated in Fig. 5.

The influence of wettability of the rock surfaces on the location of the connate water in oil-wet and water-wet systems is shown in Figs. 1 and 2. Connate water in the water-wet case is in the pendular and tightest regions of the matrix, while in the oil-wet case water

*Atlantic Refining Co., Dallas. Paper presented at sixteenth technical conference on petroleum production, Pennsylvania State College, State College, Pa., October 22-24, 1952.

appears as globules in the funicular regions.

Water-Wet Systems

When a water-wet porous medium containing oil and connate water is water flooded, the injected water first displaces the connate water,[6] which in turn displaces the oil. The oil left behind the water flood front is in the form of discontinuous ganglia, as shown in Fig. 3. These ganglia extend over several pore spaces, and since the oil is a nonwetting phase, they occupy the funicular region of the matrix.

It is obvious considering the mobility of the connate water mentioned above and adsorption that no surface-active agents could be brought to leading edge of a flood front. Since this is true, no possible benefit in the recovery of oil **at water breakthrough** should be anticipated. Consequently, surface-active agents could be beneficial only if they aid in the displacement of the bypassed residual oil ganglia.

To do this, the capillary force exerted by the water must be overcome or reduced to allow the oil to flow through the water-filled openings. This may be done by increasing the pressure gradient across the sample and by the addition of surface-active agents. To increase the pressure gradient across a reservoir much above present practice does not seem feasible. An alternative is to reduce the interfacial tension by the use of surface-active chemicals. It is estimated, however, that the interfacial tension must be less than 0.03 dynes per centimeter to permit flow of these discontinuous ganglia of oil when subjected to 1 psi. per foot pressure gradient. This also appears impractical since even in concentrated aqueous solutions of surface active agents, the interfacial tension is generally not much under 3 dynes per centimeter. (See Appendix for calculation details.)

The evidence to support the position that surface-active agents are of little value in increasing oil recovery in water-wet media was obtained from visual observation of samples with glass bead and crushed glass matrices and quantitative measurements with long-core alundum samples. The visual-observation technique used was similar to that described by Calhoun and Chatenever,[7] except that the matrix was several layers thick. Conventional Hassler holders were employed in the long-core studies.[5] The alundum cores were regenerated before each experiment for a few hours at 1,400° F.

The microscopic observation of the visual samples indicated qualitatively that little or no additional recovery over a normal water flood could be obtained using a water flood containing surface-active agents in either a specimen containing connate water and oil or one that had been water flooded to a low oil saturation. In these cases the surface-active-agent concentration was built up gradually by placing a core plug ahead of the glass cell. This simulated the adsorption - desorption action which would be expected in reservoir rock. It is interesting to note, however, when a sharp interfacial tension was introduced, that parts of the oil ganglia were broken off and flowed. Obtaining such a sharp interfacial gradient front in an actual flood is not possible. These observations were substantiated in quantitative studies with long cores, the results of some being shown in Table 1.

Notice that not only is the oil recovered at water breakthrough unaffected by interfacial tension changes for a given viscosity ratio, but oil production after breakthrough is similar for both normal and surface-active water floods. With samples which have been flooded with normal water to a water-to-oil ratio (WOR) greater than 100:1, less than 1.0 per cent additional oil is recovered by further flooding with water containing surface-active agents.

Oil-Wet Systems

When water is injected into an oil-

(Continued on page 111)

TABLE 1—RESULTS OF SURFACE-ACTIVE AND NORMAL WATER FLOODS ON WATER-WET CORES

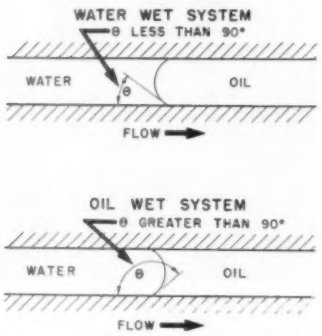
Run No.	Core material	Connate water per cent PV	Viscosity ratio μ_w/μ_o	Recovery at water breakthrough per cent O.I.P.	Recovery* at WOR = 100:1 per cent O.I.P.	Interfacial tension between oil and injected water, dynes/cm.
1.	Alundum	11.9	0.70	77	84	3.8
2.	Alundum	11.4	0.70	78	85	35.0
3.	Alundum	None	0.11	68	73	3.8
4.	Alundum	None	0.11	68	73	35.0
5.	Alundum	None	0.11	68	76	3.8
6.	Alundum	None	0.11	66	76	35.0

*The difference in recovery between Runs 3 and 4 and Runs 5 and 6 is probably the result of core properties, since one core was used for Runs 3 and 4 and another one for 5 and 6.

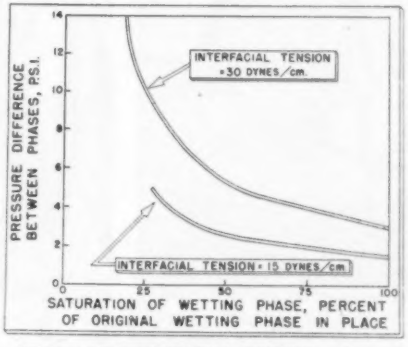
TABLE 2—RESULTS OF SURFACE ACTIVE AND NORMAL WATER FLOODS ON OIL-WET CORES

Run No.	Core material	Connate water per cent PV	Viscosity ratio μ_w/μ_o	Recovery at water breakthrough per cent O.I.P.	Recovery* at WOR = 100:1 per cent O.I.P.	Interfacial tension between oil and injected water, dynes/cm.
7.	Alundum*	16	.70	54	71	3.0
8.	Alundum*	14	.70	31	53	35.0
9.	Yates sandstone†	None	.11	18	79	3.0
10.	Yates sandstone†	None	.11	14	72	35.0

*Made oil wet with Dow Corning DC 1107. †Naturally oil-wet reservoir sandstone (receding water contact angle 76°).[9]



EFFECTIVE WETTABILITY on advancing contact angle. (Fig. 5).

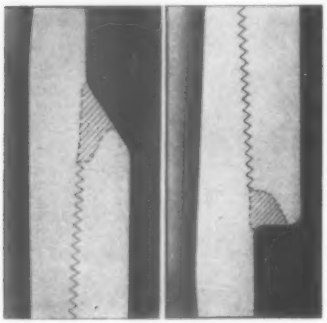

PRESSURE DIFFERENCE BETWEEN PHASES, P.S.I.
INTERFACIAL TENSION = 30 DYNES/cm.
INTERFACIAL TENSION = 15 DYNES/cm.
SATURATION OF WETTING PHASE, PERCENT OF ORIGINAL WETTING PHASE IN PLACE

EFFECT OF INTERFACIAL TENSION and pressure difference between phases on displacement of wetting phase by nonwetting phase. (Fig. 6.)

Automatic Welding of Tool Joints Made Practical

Here's how to avoid the two pitfalls that plague attempts to weld automatically tool joints for threaded drill pipe

UNTIL recently automatic arc welding of tool joints for standard A.P.I. threaded drill pipe was considered impractical. Gases generated from "dope" applied to joint and pipe threads, during preheat and welding, tend to cause porosity. Also, high welding currents make the pipe more susceptible to undercutting and cracking. However, experience has shown that both these pitfalls are readily avoidable by carefully engineered welding procedure and equipment. Considerable savings over manual welding are possible with automatic welding.



1 Sections through pin and box ends of tool joints on threaded drill pipe, shaded areas being automatic arc welds, three passes on pin end, two on box end.

Tool joints of several different types, including the shrink-fit type of assembly, flash welded and counterbore arc welded on pipe with ends either internal or external upset, are supplied by American Iron & Machine Works Co., Oklahoma City. Drillers' preferences and nature of the job usually govern choice, although the counterbore-welded joint has only recently entered the picture, and with considerable success.

By manual arc welding, two operators were able to produce an average of four counterbore welded joints per hour. With automatic submerged arc Lincolnweld equipment, the pace was stepped up to eight joints per hour, and the likelihood of further increase is seen.

The joints are of forged S.A.E. 4140-45 steel. The carbon-steel drill pipe has minimum specified yield strength of 55,000-75,000 psi., tensile of 95,000-100,000 psi., and elongation of 18 per cent in 2 in. Contour of the counterbored grooves in the pin and box ends of the joint are shown in Fig. 1. The 30°-angle grooves are roughly ⅜ in. at the widest portion, ⅜ in. deep, with a ⅛ in. radius at the bottom.

First joints to be automatically welded were 6¼ in. o.d., on a 4½-in. diameter pipe, with a welding diameter of 5⅜ in. Several sizes of electrode wire were tried. On the basis of both field and laboratory tests, a ⅛-in. L-60 (low-carbon mild steel) material, with No. 780 flux, was chosen. Welds were made with the following machine settings:

Box end: 450-475 amp., 29-30 volts, 21.35 in. per minute.

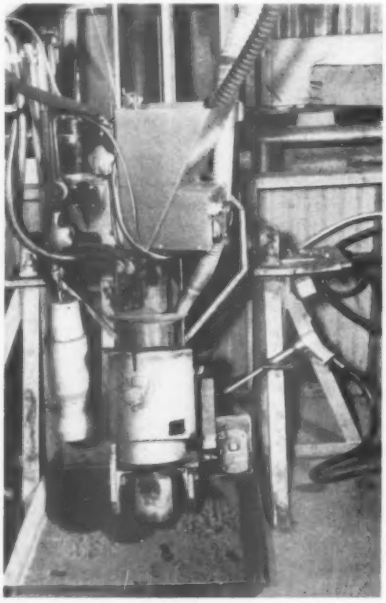
Pin end: 450-475 amp., 30-32 volts, 22.5 in. per minute.

Preheat of 450° used in both cases.

Since minimum penetration was desired, the machines were set in negative polarity, allowing the box end to be welded with two passes and the pin end with three. The pipe was set at a 15° angle from vertical, supported by booms outside the welding shops as shown in Fig. 2. For the third pass on the pin end, the pipe was lowered to a 25° angle to obtain the desired slope to the weld.

The box end of the joint was welded in 5 minutes, 50 seconds; the pin end in 6 minutes, 53 seconds—these times include all handling necessary to make one complete weld.

2 Drill pipe with joint bucked up is rolled to the first welding station at right where it is elevated to the position shown for welding; then to building at left where other end of the joint is welded.



3 Setup for welding inside buildings shown in Fig. 2. Black rubber hose deposits flux ahead (left) of electrode. Flexible tube (right) picks up excess and unused flux. Rotation is counterclockwise.

4 Asbestos collar is fitted around the joint to retain flux. This shows completed weld after flux has been removed. Collar is held tightly around joint by a bolt and wing nut through its ends.

Two separate welding machine setups are provided, one for each end of the joint. They are housed in small buildings, as shown on either side of Fig. 3 for all-weather operation. Between the buildings is a pipe rack to facilitate handling to and from the welding stations which are offset about 25 ft. to avoid interference with raising and lowering the pipe lengths. Upon reaching the end of the rack after welding, the pipe is moved lengthwise across dollies to another rack where it proceeds to machining and inspection operation. A separate building contains equipment for bucking up the joint to the pipe and machining the weld on the box end.

Fig. 3 shows how a rubber hose has been used to replace the standard flux chute supplied with the equipment. It is moved from the normal center position to one side of the flux hopper to avoid interference with the pipe while welding. Another modification was reversal of the electrode jaws in order to make it easier for the operator to guide the wire into the welding groove and to remove the flux through the flexible exhaust hose while the joint was being turned in a counterclockwise direction.

Because of the narrow weld, a device for holding the flux was required. A conical annular ring about 2 in. wide and ⅛ in. thick, cut from a sheet of asbestos and held tightly around the joint by a bolt and wing nut through its ends, was employed for that purpose (see Fig. 4).

Wettability

(Continued from page 109)

wet porous medium, the injected water proceeds through the funicular region, leaving extensive areas of oil as a continuous phase through the rock and in the smaller pores, in the pendular regions and in a film on the matrix particles as in Fig. 4. In order for the oil to be displaced from this oil-wet system, the water (nonwetting phase) must be made to penetrate the regions where oil is present. To do this, either the pressure gradient must be increased or the interfacial tension must be decreased. This is illustrated in Fig. 6, a typical capillary pressure curve of a wetting phase (oil) being displaced by a nonwetting phase (water). The upper curve represents the effect of pressure difference between the phases on oil saturation when the interfacial tension is 30 dynes per centimeter (no surface-active agents). The lower curve (with interfacial tension = 15 dynes per centimeter) shows that a lower oil saturation may be obtained with a lower pressure difference between the phases. It can be seen from this figure that an increase in pressure gradient or decrease in interfacial tension will lead to a higher recovery of oil. This is true because the oil is present as a continuous phase in contrast with the discontinuous distribution of residual oil in the water-wet case.

These observations have been borne out both in flooding studies with cores and under the microscope. Notice in Table 2 that a significant increase in oil recovery may be realized at both water breakthrough and during the course of the flood when two phases are being produced. Similar effects can be obtained by increasing the pressure gradient.

Conclusions

1. From considerations, both theoretical and experimental, no increase in oil recovery should be expected from water-wet porous media by the use of surface-active agents.

2. In oil-wet systems, some benefits are possible, but the economics of a surface-active-agent injection process is uncertain.

3. The reason that oil-wet systems can benefit by use of surface-active agents is that the oil left behind the water front is a continuous phase in contrast to the discontinuous distribution in the water-wet system.

Appendix

The calculation upon which this estimate of 0.03 dynes per centimeter is based follows:

In order to displace the oil, it must move through the largest opening available to it. Assume: (1) that such an opening may be described as a cylindrical capillary of radius, $r = 0.001$ in. (this is much larger than the pore radii in most reservoir rocks); (2) the contact angle, Θ, in the water is 30°, or $\cos \Theta = 0.865$; (3) from microscopic studies in this laboratory, length of an average residual oil globule is 0.004 in.; and (4) a reservoir pressure gradient of 1 psi. per foot of reservoir length.

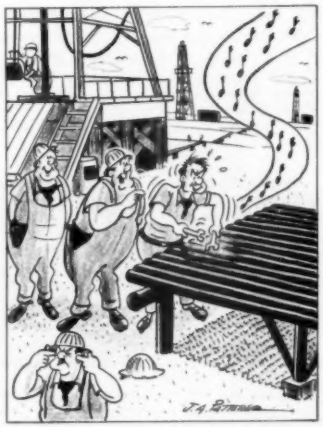
This pressure gradient of 1 psi. per foot is equivalent to 0.00033 psi. across the length of assumed globule. Substituting this pressure drop and the other assumed values in the capillary equilibrium equation for cylindrical tubes,

$$P = \frac{11.6 \times 10^{-6} \gamma \cos \Theta}{r}$$

where

P = pressure to move interface, psi.
γ = interfacial tension (oil-water), dynes per centimeter
Θ = contact angle in water
r = capillary radius in inches

gives an interfacial tension, $\gamma = 0.03$ dynes per centimeter.



"When you get through with that symphony, would you mind playing the Tiger Rag?"

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Acknowledgment

The authors wish to express their appreciation to Dr. J. M. Mozley for obtaining the photomicrographs, to R. E. Wyant for his assistance with the experimental work, and to Dr. R. L. Slobod for his many helpful suggestions.

BOOK

FIFTY-YEAR INDEX TO A.S.T.M. TECHNICAL PAPERS AND REPORTS—1898-1950. Published by the American Society for Testing Materials, 1916 Race Street, Philadelphia. 207 pp.

This is a detailed author and subject index to the technical papers and reports dealing with materials, particularly their properties and testing, appearing in A.S.T.M. publications covering the period from 1898 through 1950. It should make readily available to the materials technologist, the researcher, the librarian, and others, pertinent information on a particular subject.

GEOLOGICAL REPORT:

WORLAND FIELD* . . .

Big Horn and Washakie Counties, Wyoming

This pool has stimulated interest in the deeper structures of the Big Horn basin. It has served to emphasize the Embar possibilities in the eastern portion of the basin and has highlighted the economic potentialities of sulfur production in the area.

by John S. Wold

WORLAND field lies in the southeastern part of the Big Horn basin, approximately 9 miles north of Worland, Wyo.

The field is a large basinward fold with a general northwest - southeast trend. The structure lies in the alluvial valley of the Bighorn River which bisects the producing area. Well elevations are approximately 4,000 ft.

Discovery . . . A flattening of surface dips in the Willwood formation (Wasatch) with possible slight reversal (northeast dip), prompted a geophysical program by Pure Oil Co. This led to the delineation of the Worland structural feature. Primary credit for discovery, is therefore, credited to the seismograph.

In June 1945, Pure spudded in the discovery well, 1-E Worland unit, in NE NE NW 18-48n-92w, which was drilled to a total depth of 11,379 ft., approximately 100 ft. in the Big Horn dolomite (Ordovician).

Core recovery in the upper Embar (Permian), a porous dolomitic lime section, showed indications of gas. Drill-stem-test recovery consisted of toxic hydrogen sulfide gas, which necessitated closing the testing tool after 13½ minutes because of danger to personnel. The well was tested in March 1946 for an initial production of 165 bbl. per day of 43.5°-gravity light-green oil with a gas-oil ratio varying between 4,900 and 15,000 cu. ft. per barrel.

*From the Wyoming Geological Association Guidebook, seventh annual field conference, southern Big Horn basin, Wyoming, 1952.

Complex operations . . . Operations in the field soon proved to be complex because of the necessity of handling large quantities of hydrogen sulfide gas, by the formation of hydrates in the tubing, and the depths involved. The history of overcoming these difficulties makes an interesting engineering story.†

During the first period of development, four operators (Pure Oil Co., Trigood Oil Co., Sharples Oil Corp., and Carter Oil Co.) developed their own leases. It soon became apparent that with the depths involved, the high-gas-oil-ratio wells, and the high percentage of hydrogen sulfide, unitization of the field was economically desirable. As a result, a working agreement designating Pure Oil Co. as operator was completed May 1, 1950. This permitted unit operation of the field and the gasoline plant.

During the first period of operation with the four operators developing their own leases, oil was produced and run from well tank batteries. The second phase of development was accompanied by the building of a gasoline, crude - stabilization, and L.P.G. plant, and the building of a sulfur-recovery plant by Texas Gulf Sulphur Co. The hydrogen sulfide content of the Embar gas averages 30 per cent by volume. This content permits the extraction of approximately 11 tons of sulfur per million cubic feet of sour gas.

Sulfur . . . The economic aspects of the sulfur have been a significant feature in the field's history. At the present time, approximately 300 tons of sulfur are being produced a day. The sour oil and gas is conducted through high-pressure systems to the plants where the hydrogen sulfide is extracted from both the oil and gas. After sweetening, the gas is processed for the recovery of propane, butane, and natural gasoline. Excess residue gas is sold to Montana-Dakota Utilities Co.

†J. I. Morris, "The Worland, Wyoming, Field," paper presented at spring meeting, Rocky Mountain District, A.P.I. Division of Production, Casper, April 1951.

Frontier development . . . Currently, a development program is under way in the Frontier formation which produces both sweet gas and high-gravity, sweet oil. Three high-gas-oil-ratio Embar wells have been recompleted as dual producers of sweet gas and distillate from the Frontier. A fourth well has been recompleted as a Frontier gas well in order to meet sweet-gas sales contracts. Three additional wells have been drilled to the Frontier and a fourth is currently drilling.

Stratigraphy . . . In general the surface cover of the area consists of Quaternary alluvium and some older sand and gravel terrace deposits.

The Willwood formation (Eocene) is exposed on the east side of the field. On the west side of the Bighorn River there are only occasional exposures of the Willwood at spots where the terrace deposits have been eroded deeply enough to uncover it.

The following log of the 1 Worland unit illustrates a representative section. To date it is the deepest test in the field.

Formation—	Formation top	Thickness in feet
Tertiary		
Willwood		245
Fort Union	265	1,840
Cretaceous		
Lewis	2,105	1,330
Mesaverde	3,435	885
Cody	4,320	2,815
First Frontier	7,135	105
Second Frontier	7,240	168
Third Frontier	7,408	128
Fourth Frontier	7,536	64
Mowry	7,600	405
Muddy	8,105	55
Thermopolis	8,160	158
Dakota	8,318	112
Jurassic		
Morrison	8,430	210
Sundance	8,630	463
Gypsum Springs	9,103	75
Nugget	9,178	100
Triassic		
Chugwater	9,278	622
Dinwoody	9,910	70
Permian		
Phosphoria	9,970	270
Pennsylvanian		
Tensleep	10,240	180
Amsden	10,420	150
Mississippian		
Madison	10,570	550
Devonian		
Three Forks	11,120	155
Ordovician		
Bighorn	11,275	103+

Structure . . . As may be seen from the accompanying structural map contoured on top of the Embar, Worland field is an asymmetric fold with the steep side toward the mountains.

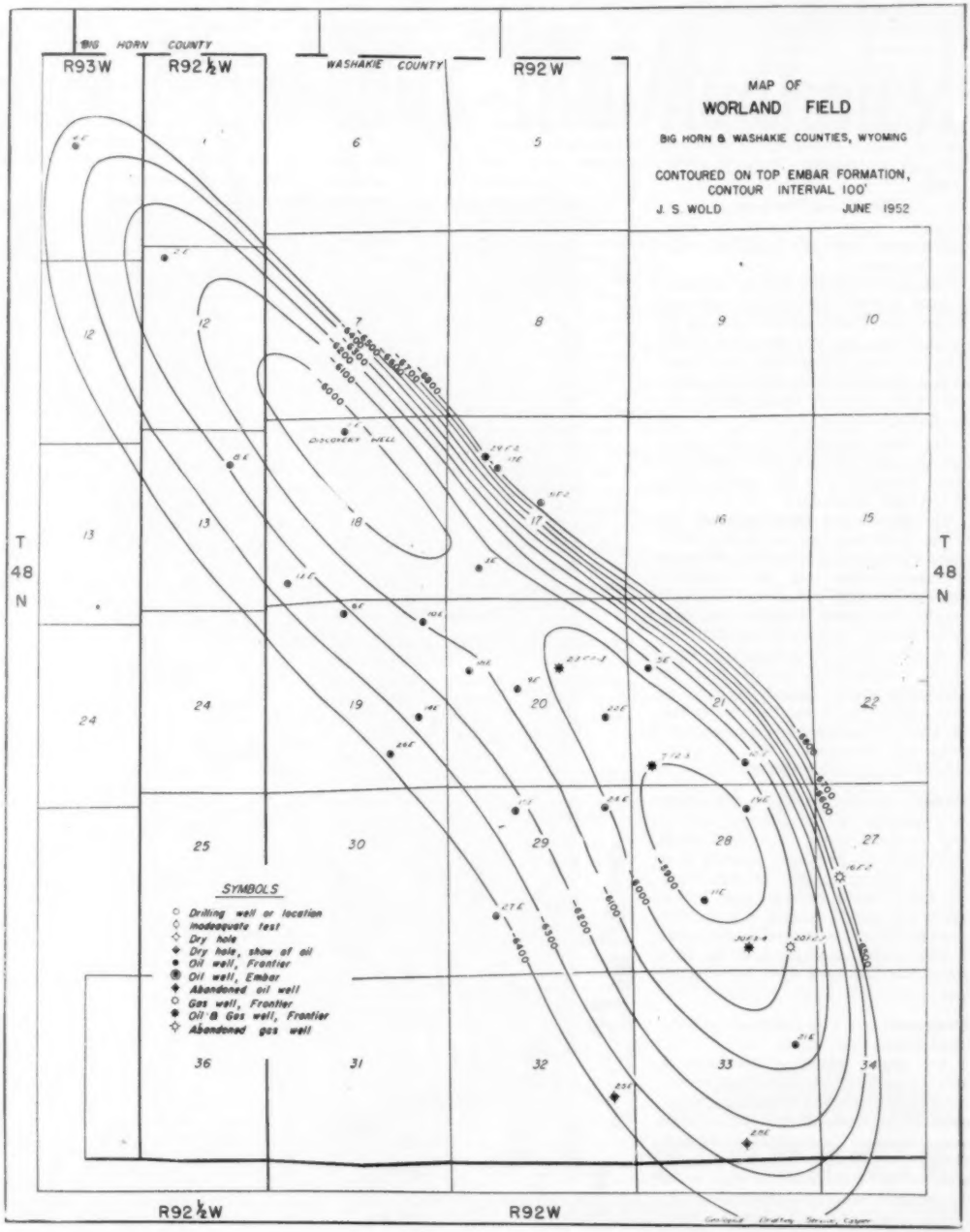
The field is the culmination of a northwest-southeast trending, basinward

THE AUTHOR

John S. Wold studied geology at Union College, St. Andrews University, Scotland, and received his M.S. degree from Cornell University. In 1939 he joined Magnolia Petroleum Co., working in Oklahoma and Texas. After 5 years in the U. S. Navy, he joined the former Barnsdall Oil Co. in Louisiana and Texas. He was transferred to Casper, Wyo., in 1948 as Rocky Mountain district geologist for Barnsdall. Since 1950 he has been a consulting geologist in Casper.

fold which is about 25 miles long. The local Worland closure is about 10 miles long and 3 miles wide.

The Husky Oil Co.-Wilshire Oil Co. Five Mile Embar discovery well in Section 29-49n-93w is located on this line of folding. The Husky-Wilshire well is thought to be on a separate closure and is located down the plunge of the major fold. In the vicinity of the Husky-Wilshire well the northeastern limb of the fold is thought to be associated with a major reverse fault dipping to the southwest. The asymmetric nature of Worland field, with rapidly accelerated dips on the northeast flank indicates the possibility that a similar structural relationship may exist in this area. Since no oil-water contacts have been established in the Embar at Worland Dome or Five Mile, it is possible that



production could link up between the two areas. To the southeast, the trend continues 4½ miles to General Petroleum Corp.'s South Frisby structure.

The Worland Dome feature has about 1,000 ft. of closure on the Embar and 700 ft. of closure on the Frontier. There appears to be little axial displacement with depth as exhibited by the superposition of the shallower structural pictures as compared to the deeper. From the structure that is apparent on the various horizons, it seems likely that major structural growth took place during the late Upper Cretaceous time and that it had almost completely died out by Eocene - Wasatch (Willwood).

Producing Horizons

Frontier . . . In the vicinity of Worland Dome there are developed four Frontier sands.

Generally these are fine to medium-grained, angular, glauconitic, "salt and pepper" sands with various amounts of tripolitic cement. The basal or fourth Frontier sand is of limited extent with its best development at the southeastern end of the field. It shales out to the northwest.

The **first Frontier** is a shaly sand, carrying some shows, but has been generally considered by the operators to be too tight to produce.

The **second and third Frontiers** are better developed, but are broken with shaly intercalations. The third Frontier is nonproductive on the southwest flank of the field because of increased tripolie. The **fourth Frontier** sand produces at the southeastern end of the field. The map will indicate the status of the various wells and the sands in which they are completed. To date the best completion in the Frontier is the 29 Unit, a second Frontier producer which was completed in 1951 for 1,037 bbl. of 42°-gravity green oil.

Muddy . . . From samples, the upper three-quarters of the Muddy sand is fine grained, dense, and tight, with shale partings. The lower quarter is a fine to medium-grained, glassy, angular, friable sandstone with good porosity. It has carried staining in a number of wells. On drill-stem test in the 1 and 2 Unit wells, small amounts of 34°-gravity oil and fresh water were recovered.

Phosphoria . . . This formation may be divided into three zones:

An **upper dolomitic limestone** is about 100 ft. thick with vugular porosity. This porosity varies from pin point to interconnected vugs and solution channels. Fracturing probably plays an important part in the permeability of this zone. Porosity runs up to 18 per cent but will average closer to 7 per cent; average permeability is about 6.5 md. This zone includes the Embar pay and will average about 65 ft. net, thickening from about 40 ft. on the northeast flank to 90 ft. on the southwest.

The **middle Embar zone** consists of dense, dolomitic limestone about 50 ft. thick, with black chert and pyrite.

The **lower zone,** about 120 ft. thick, is a dense, dolomitic limestone with anhydrite and pyrite; it has a sand transitional zone at the base.

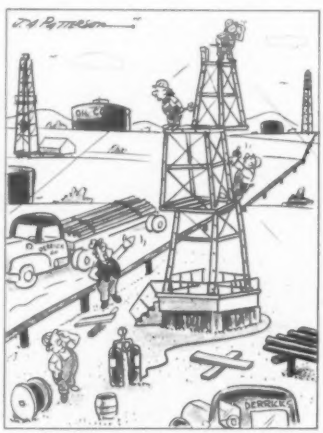
Tensleep . . . The Tensleep is a fine to medium-grained, white and pinkish, subangular, quartzitic sandstone which becomes very dolomitic towards the base. It is gradational into the Amsden.

The 4 Unit well was cored through the Tensleep showing black-oil staining in the upper portions, but decreasing porosity in the lower sections carried only mottled staining. No oil was recovered on a drill-stem test. The best Tensleep test to date was taken in 6 Unit, which recovered 1,620 ft. of 22°-gravity oil in 20 minutes. To date few wells have penetrated the Tensleep and the drill-stem test recoveries have not been impressive.

The lower Paleozoic section has not been interesting. The lower two-thirds of the Madison is dolomitic with some zones of pin-point porosity and some staining, but it has tested only water. The Devonian has fair porosity with no shows. The Big Horn in the No. 1 well was a granular, fairly dense dolomite with no shows.

Production

Embar wells high on structure (that is, from —5,900 to —6,200 ft.) have a tendency to produce higher gravity oil (37°-45°) with a gas-oil ratio of 5,000-18,000. The lower wells (—6,200 to —6,600 ft.) produce a lower-gravity oil (20°-38°) with gas-oil ratios from 1,500-4,500.



"Can't you guys do anything right?"

The Embar lends itself well to acidizing. The usual procedure is to acidize with an initial slug of 5,000 gal., following by a 15,000-gal. acidization. Some wells have been treated with as much as 55,000 gal. The present Embar producing area is about 7 miles long and 1½-2 miles wide, covering some 6,500 areas.

To January 1, 1952, the Embar had produced 8,596,000 bbl. of 20°-45°-gravity oil, and about 50 billion cubic feet of sour gas. The original rock pressure was 4,580 psi. This has declined rapidly. Embar sour gas reserves have been variously estimated from 180-300 billion cubic feet. The Embar oil reserves are reported to be between 30 and 50 million barrels.

Current Embar production is about 30,000 M.c.f. of sour gas and 3,500 bbl. of oil per day. From this daily sour gas production is extracted about 320 long tons of sulfur, 10,000 gal. of propane, 8,500 gal. of butane, and 12,000 gal. of natural gasoline. At present prices the sulfur value of the sour gas is two or three times the value of the sweetened gas. The capacity of the sulfur processing plant is the limiting factor on production.

Frontier production . . . The Frontier has produced to January 1, 1952, 50,000 bbl. of 44°-gravity oil from the second Frontier and 7½ billion cubic feet of gas from all three Frontier sands.

Current daily production from the Frontier is 1,000 bbl. of oil and distillate and 15,000 M.c.f. of gas per day.

BOOKS

OIL AND GAS FIELD DEVELOPMENT IN UNITED STATES AND CANADA. By National Oil Scouts and Landmen's Association. Published by National Oil Scouts and Landmen's Association, Austin. 994 pp. $10.

This 1952 year book (Volume XXII) reviews the activities of the oil industry during 1951. The book covers 35 states and western Canada. It contains detailed data on well completions, exploratory developments, deep tests, discoveries, extensions, production of oil and gas, leasing, undeveloped acreage held by major companies, geophysical and core drill prospecting, pipe-line construction, and other data pertinent to the state or district being reviewed. The book contains a wealth of statistical information plus many illustrations in the form of index maps, columnar sections, stratigraphic correlation charts, cross-sections, and maps showing areal geology or structural features. Also included in the book are three resumes of 1951 developments. "General Review of Oil and Gas 1951," reprinted from an American Petroleum Institute news release of December 19, 1951; "Exploratory Drilling 1951" by Frederic A. Lahee, Research Counselor, Sun Oil Co.; and "Proved Reserves of Crude Oil, Natural-Gas Liquids, and Natural Gas," reprinted from a joint report by the American Petroleum Institute and the American Gas Association. The last item in the book is a roster of active and associate members.

Over Mountains - Thru Mudholes!

The laying of a section of 30-inch pipeline for the Texas Eastern Transmission Corp. across the precipitous mountains of Ohio and West Virginia this spring was a job that had looked "too tough" to other pipeliners. That's when H. C. Price Co. crews were called upon to take over. *Mountains so steep that six winch tractors were required to hold ditching equipment . . . rock ledges hundreds of feet thick . . . incessant rains that turned the right-of-way into an endless mudhole . . . and the pressure of a fast-approaching deadline.* All these problems were met in stride and the new pipeline completed on time—once again demonstrating that HCPCO is truly "America's Foremost Pipeline Constructors."

Also, manufacturers and distributors of SOMASTIC and HEVI-COTE pipe coating materials.

PIPELINE
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PHILADELPHIA Orchard 3-8132 • BARTLESVILLE LD-8 • NEW ORLEANS Edison 2281

America's Foremost Pipeline Constructors

Operation of Power Slush Pumps . . . *in compound*

Series operation has resulted in increases of 25 to 50 per cent in available horsepower over single and parallel operations

by Thomas Pennington*

EARLY research work on hydraulic horsepower and its effect on drilling rates indicated that the pressure drop in the bit nozzle and the volume of fluid circulated, directly affected the rate of penetration. Initial field tests indicated that when the nozzle velocity was held constant and the maximum effective bit weight could be employed, the drilling rate obtained was proportional to the rate of circulation. It became apparent, however, that the high circulation rates and pressures indicated under these conditions would not be feasible in normal drilling because of the great size and weight of the mud pumps which would be required for sustained operations.

Tests were then conducted holding the circulation rates constant and varying the nozzle fluid velocity. The data obtained indicated that the maximum effective bit weight and the drilling rate were directly proportional to the nozzle fluid velocity.

Under the above conditions of maximum volume and nozzle velocity on any given rig, drilling rate is essentially proportional to the hydraulic horsepower. On this basis it was apparent that significant savings in drilling costs could be effected by utilizing the maximum hydraulic horsepower from available rig pumps.

IN the operation of power pumps, consideration has been given to parallel and series hookup. However, it has been felt that series operation would be more desirable since (1) pump parts would be less subject to wear because of lower pressures on each pump as compared to parallel operations at the same volume, (2) higher pressures could be used with present rig pumps without the necessity of purchasing larger pumps as well as (3) obtain more flexible utilization or horsepower as compared to a larger pump. The primary disadvantage of this hookup, of course, which applies only to power pumps, is the synchronization of pump phases when operating in series.

Compound operation was not as difficult as first anticipated, and Humble has conducted a number of drilling operations in Louisiana and recently in Southwest Texas using two power pumps connected in series. One company rig in Louisiana has been using this system for approximately 1 year, and records of pump repairs and expendable pump parts have shown that the pumps are apparently no more expensive to maintain with this type of operation than with normal single pump operation.

Auxiliary Equipment

The only extra equipment installed on the rigs to make this operation possible was a differential relief valve, two pulsation dampeners, and 15-ft. vibrator hoses for each pump. A choke manifold was installed on one rig as a precautionary measure but was found to be unnecessary. An increase in available hydraulic horsepower of 25 to 50 per cent over single and parallel operations has been obtained by operating the pumps in series.

Tests . . . In the first tests with series pump operation, the differential relief valves were actuated quite often while the pumps were being started which caused excessive erosion of the valves and seats. Since then, stronger differential springs have been installed in these relief valves which makes their operation much less frequent, and no further difficulty has been experienced with erosion. The Humble company is also experimenting with a new type differential pressure relief valve which thus far has given satisfactory service. Drilling with the pumps compounded in series has been carried out efficiently; and after rig personnel become accustomed to this method of pump operation, only 5 to 10 seconds more time has been required to start the pumps between connections. Experience thus far indicates that power mud pumps may be operated in series, without the use of special drives, employing fluid couplings, torque converters, or other means of providing slippage between the pump and prime mover.

*Senior supervising engineer, petroleum engineering division, Humble Oil & Refining Co., Houston. Paper presented at twelfth annual meeting of American Association of Oilwell Drilling Contractors, Oklahoma City, September 28-30, 1952.

Comparative Data

Power pumps were first connected for series operation on a company drilling barge for drilling a wildcat well near Intracoastal City, La., in late 1951 near a well drilled during the previous year with another company barge rig. Hole sizes and drilling depths were comparable, and by comparison the second well required 223½ fewer rotating hours (9.3 days) or 32.5 per cent less time to drill an equivalent amount of 12¼ and 8⅝-in. hole from approximately 1,900 ft. to 13,000 ft.

Thirty-eight bits were required to drill the first well and thirty for the second. The increased penetration rate attained on the second well is attributed primarily to the higher hydraulic horsepower used; however, a 10 to 12 per cent oil emulsion mud was also used for drilling fluid in the second well part of the time and is estimated to have contributed to the increased rate of penetration by 20 per cent. An average of 698 hydraulic horsepower was used while drilling 12¼-in. hole from 6,650 to 8,500 ft. and from 512 to 569 ft. Pumps were compounded approximately 79 per cent of the time.

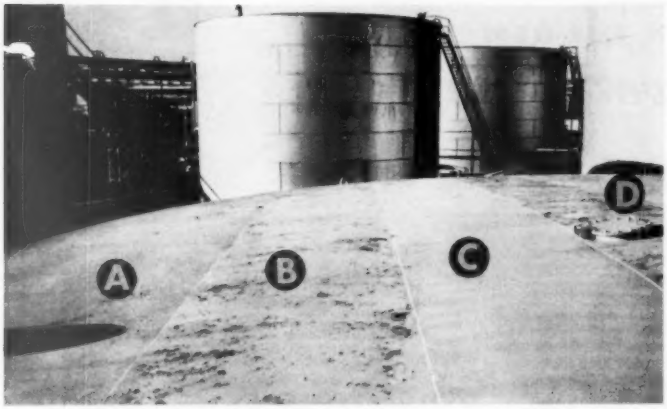
Average rate of penetration was 16.3 ft. per hour for the first well at an average hydraulic horsepower of 370 and 24.2 ft. per hour at an average of 508 hydraulic horsepower for the second well.

30 Per Cent Less Rotating Time

Wells drilled by two company rigs during the past year in the Lake Mechant area, Louisiana, show that approximately 7 days or 30 per cent less rotating time has been required for drilling 13,000-ft. wells when using pumps in series operation developing 480 to 490 hydraulic horsepower as compared to parallel pump operations at 340 hydraulic horsepower. Even better results have been experienced in the Little Lake area, Louisiana, where the average drilling rate has been increased from 26.3 ft. per hour using parallel pumps at 470 hydraulic horsepower to as high as 62.2 ft. per hour by the use of series pump operations and a hydraulic horsepower of 590 while drilling 11,000-ft. wells. This practice has reduced drilling time by approximately 6 days.

Operation of power pumps in series has just begun in the Southwest Texas area on a company rig; and while data is incomplete, a maximum of 680 hydraulic horsepower has been developed thus far which is an increase of 29 per cent hydraulic horsepower for this rig over single pump operation.

The Humble company is also currently investigating the effects of increased horsepower on drilling rates on company rigs in the West Texas area, and it is hoped that this work will lead to further improvement of drilling rates in this area.



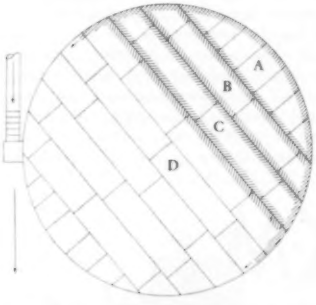
SECTION of tank roof which was tested at Magnolia's Beaumont, Tex., refinery. "A" and "B" were pretreated with commercial preparations. "C" was treated with test material; "D" was not pretreated. Photo was made 20 months after painting.

Test proves undercoat vital to success of tank painting

A SURFACE preparation used in the repainting of rusted steel tanks shows considerable promise in cutting down on maintenance problems at Magnolia Petroleum Co.'s Beaumont, Tex., refinery.

The company, using the pretreating method during hand cleaning of steel surfaces, has proven that selection of the proper undercoat is vital to the success—or failure—of the painting job.

The pretreating material was tested along with three other commercial means of painting a tank roof. After 20 months' service its outer coat was in excellent condition, while others had failed in varying degrees.



ROOF LAYOUT for tank-painting test. Letters correspond with those in photograph at top of page.

How test was made . . . The test was conducted on a tank roof which had been previously painted but which required repainting due to failure of the protective coating. The roof was divided into four sections, each of which was cleaned by hand brushing although all of the rust was not removed. Two of the sections, "A" and "B" (see cuts), were pretreated with commercial preparations. Section "C" was treated with the test material, and "Section D" was not pretreated.

All of the sections were finally covered with a quick-drying red-lead primer and received two coats of aluminum surface paint. After 20 months, Section D had an excellent surface coat remaining while the others had failed.

Costs up, however . . . Pretreatment costs are expected to increase the initial cost of painting by about 10 per cent, which will be more than returned in more effective utilization of labor and conservation of materials with the cutting down of premature failures due to inadequate surface preparation.

Pretreating material used was developed by Socony Paint Products Co. and is listed as 38-O-3 Penetrating-Oil Preparation.

Truck-Tire Changer

Unit, made out of scraps, saves a lot of hard work

A TRUCK - TIRE - REMOVAL unit, which can be assembled from scrap metal, eliminates the time-consuming and tiresome task of removing truck tires from rims.

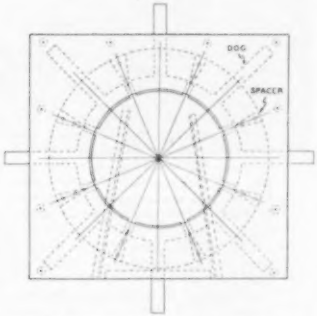
Used in conjunction with a hydraulic jack, the unit makes it possible to remove and mount a tire without danger of bruising the casing, as in the case of tire irons and mallets.

The unit, devised at Sinclair Refining Co.'s Houston plant, consists essentially of a cage with a round hole in the top. The tire, on the rim, is placed on the jack and rolled underneath the cage. The jack is then used to force the rim upward through the hole while the tire falls off underneath.

Construction . . . The cage is made up of an upper section consisting of a square piece of plate steel with a hole cut in the center large enough to handle any size truck wheel. Immediately below the upper section, a disk is attached which is separated from the top plate by spacers. The disk serves to support eight dogs, each of which resembles the letter "T," with the top part in the form of an arc. These dogs may be pushed in or pulled out to diminish or enlarge the opening through which the tire rim is forced.

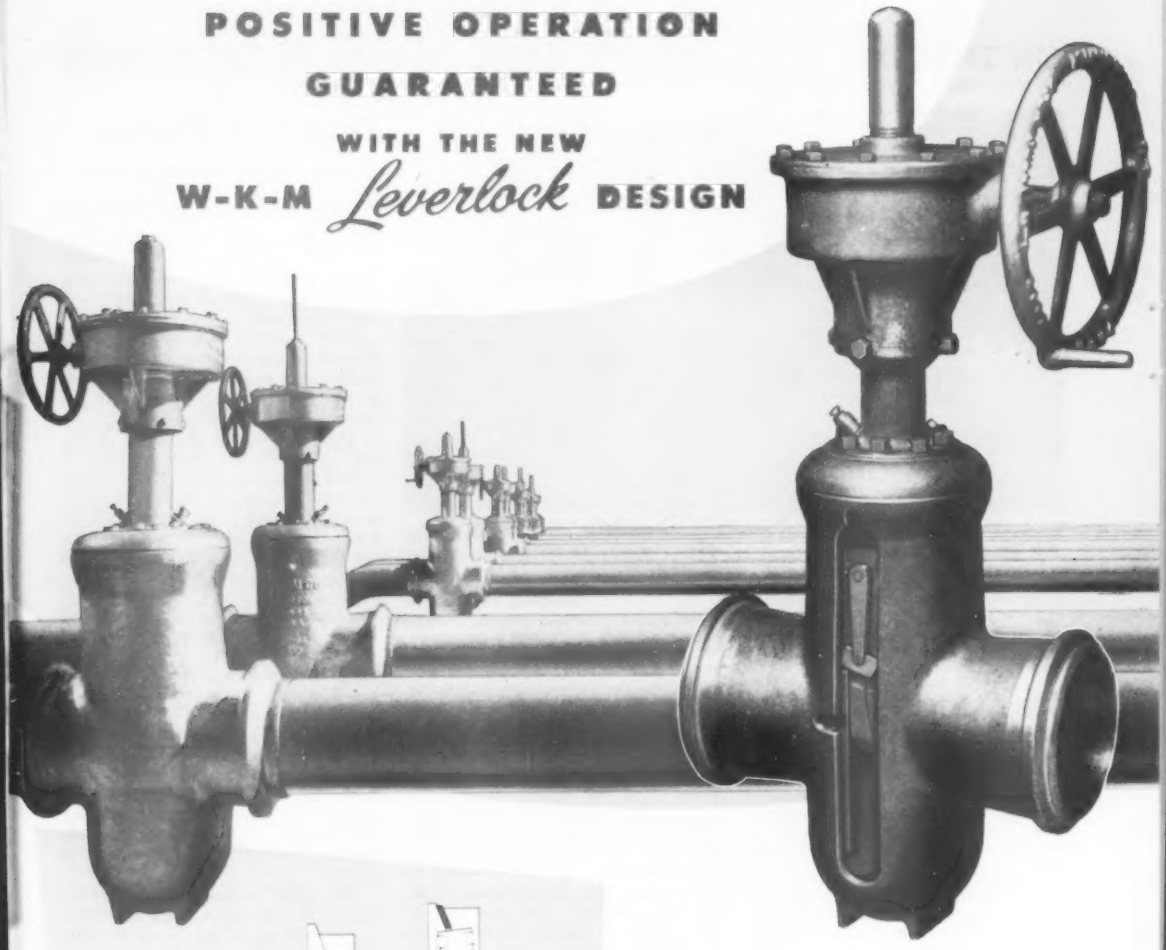
The upper section is supported by lengths of 2-in. pipe welded to a lower frame made up of angle irons. Attached to the lower frame are two lengths of angle iron which run inward at an angle and are used to support the tire when it is removed from the wheel.

In removing a tire, the wheel is placed on a suitable adapter which can be accommodated on a jack. The jack and wheel are slid into the cage. The



PLAN VIEW, showing dogs and spacers.

POSITIVE OPERATION GUARANTEED WITH THE NEW W-K-M *Leverlock* DESIGN



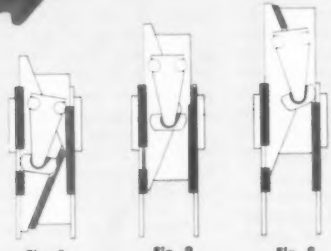


Fig. 1 Fig. 2 Fig. 3

The Leverlock Assembly is a mechanical device which positively holds the gate and segment in neutral position while the valve is being opened or closed, and permits expansion of the gate assembly at the proper time for seating in opened or close position. A pin in the gate and one in the gate segment are linked together by means of the Leverlock arm. Guides or rails, integral with the seat skirts, provide for the proper movement of the Leverlock arm and shoe as well as guide the vertical travel of the gate assembly. Fig. 1 shows the gate and gate segment in closed position. When the valve is opened, the Leverlock arm swings to the right and travels between the guides on the seat skirt (shown in heavy black). As the Leverlock arm cannot swing to the right or left, it holds the gate and segment in neutral position positively, see Fig. 2. As the gate and segment reach the open position, the Leverlock arm swings into a slot provided on the seat skirt, see Fig. 3, thus permitting the gate and segment to expand against the seats. Clearances are shown in red on drawings above.

The Leverlock feature provides sure control over the gate and segment so that they expand only in open and closed position and remain in neutral while the valve is being operated.

Leverlock operation combined with the basic W-K-M Through-Conduit, expanding gate design provides a pipeline valve whose performance is unequalled in the most extreme service. Sure lever-action expansion guarantees that W-K-M Valves will always open or close freely regardless of service conditions. Leverlock Operation and other advantages such as vapor-tight seal against both seats, the ability to maintain and overhaul on the line, no-surge operation, and full through-conduit design assure the user of getting far more in valve performance for his money when his specs read, "W-K-M Valves All the Way."

W-K-M *Valves*

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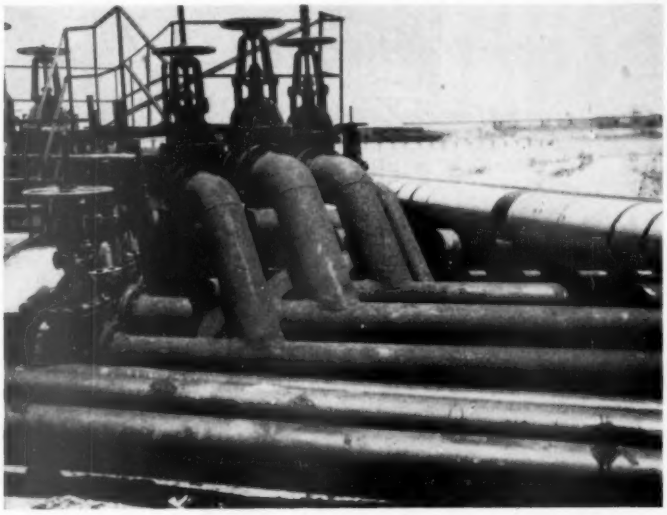

ODD-ANGLE WELDING JOBS like this can be done easily by the method described here.

This method will help you in . . .

Joining Pipe at Odd Angles

W. R. Hart*

THE method here described can be used for making welded joints in the field with pipe of the same or different diameters, meeting at any angle and whether or not their axes are in the same plane.

The only tool needed is a piece of lightweight structural channel or angle iron having a width between edges of one-quarter to one-half of the diameter of the pipe and a length of 8 to 12 pipe diameters.

Channel or angle iron is used because when the edges are in contact with the pipe the edges are parallel with the pipe's axis. Starting back along one edge about four or five times the width, cut on a line to the end of the other free edge and file the end to a point lying on the line of contact with the pipe. Let's call this the scriber.

Making a "Y" or "T" Connection

Block up the two pieces of pipe to be joined to a foot or more off the ground, to give access for scribing all around. Both pieces of pipe should occupy the same relative position as they are to have in the finished job and should be in contact at one point.

Chalk a stripe on each pipe as near as possible, at a guess, to where they will meet when welded. Mark the branch pipe exactly opposite the point of contact and apply the scriber so that the long edge passes through this mark and its point is in contact with the main pipe. Draw a short line beyond this point and another along the scriber on the branch to serve as matching points when getting ready to weld. This is most important as the angle approaches 90°.

Now mark the edge of the scriber plainly at the point it extends beyond the square end of the branch. In 10° or 15° steps, going around the branch in each direction, mark on the main pipe where the scriber point touches it and also on the branch opposite the mark on the scriber. Connect these points with smooth curves and you have the lines on which to cut both pieces for the welded joint.

If the two pipes are securely blocked or held in place it is possible to file a nick in the scriber to guide a pencil and slide the scriber around the pipe, marking both lines at one time.

Turning Angles in a Run of Pipe

Place the two pieces of pipe in the desired relative position and wedge a flat piece of sheet metal or thin plywood so as to bisect the angle between the open ends. Use the mark on the scriber to locate the line for the cut. It is more economical of pipe and more convenient to cut to a pattern than to turn one of the pieces through 180° and weld.

To make the pattern run straightedges along both pieces of pipe opposite the point of contact till they meet and measure the distance either extends beyond the end of the pipe. Take a piece of pipe of the same diameter and block it up against any flat vertical surface such as a plastered wall. Then wrap a sheet of paper around it even with the end making the lap come either at the top or opposite the point of contact.

Use the scriber marked for the distance the straightedge measured and swing the pipe till the point touches the wall. Use the scriber, in contact with the wall, to locate points all around the pipe, lay the paper flat, and draw in the curve. Now wrap the paper around the pipe to be cut, properly locating the lap, and make punch marks on the line.

*Westinghouse International. Formerly petroleum engineer for Socony-Vacuum Oil Co., Cairo, Egypt.

Portable Nose

A "GAS SNIFFER" is shown being used by L. F. Hummel, chemist-clerk, Shell Oil Co., at its Elk City, Okla., gasoline-plant compressor room to search out possible accumulations of combustible gases or leaks. Gases are collected through a long, tubular detector wand connected by cable to a strap-suspended instrument panel which registers the degree of air contamination.

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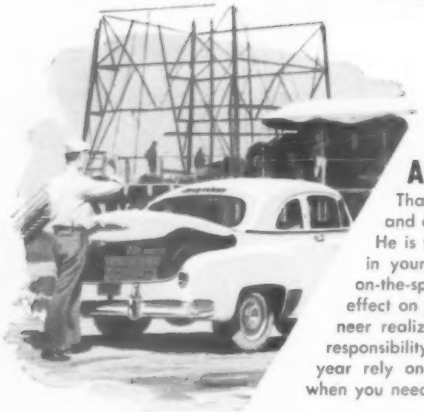

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No. 33

THE JOURNAL'S WEEKLY Engineering Reference SECTION

CENTRIFUGAL PUMP CALCULATIONS—2

What Is Meant by "Suction Head" and "Discharge Head"?

by B. J. Lerner* and A. J. Barduhn*

THE over-all energy balance may be applied to the suction side of the pump (Fig. 1) between Points 1 and S. Taking the pump suction flange center-line as the potential head datum line so that $Z_S = 0$, the suction line energy balance is:

$$Z_1 + \frac{P_1}{\rho} = \frac{P_S}{\rho} + \frac{u_S^2}{2J} + F_S \quad (1)$$

where

F_S = all frictional losses in the suction line

u_S = suction line linear velocity, and

P_S = pressure at pump suction inlet

We may solve Equation 1 for the suction line pressure head, which is the energy quantity most easily measured:

$$\frac{P_S}{\rho} = \left(Z_1 + \frac{P_1}{\rho} - F_S\right) - \frac{u_S^2}{2J}$$

$$= h_S - \frac{u_S^2}{2J} \quad (2)$$

The group, $Z_1 + \frac{P_1}{\rho} - F_S$, is defined as the "suction head," h_S, and is equal to the sum of the pressure and kinetic energy heads at the suction inlet to the pump. Thus, it may be obtained from a single measurement of the pressure at the suction inlet, provided the flow rate and suction-line diameter are known. For the situation where the suction storage tank or source of supply is below the pump, the suction head is generally negative, except in the case of positive pressure on the suction supply tank. To avoid the negative sign for the suction head, it is common practice to define the negative value of suction head as "suction lift":

$$\text{suction lift} = -(\text{suction head})$$

$$= -h_S = -\left(Z_1 + \frac{P_1}{\rho} - F_S\right)$$

Use of the suction-lift term introduces the possibility of error in the sign of the suction head quantity in subsequent horsepower calculations. However, its use can often be avoided by employing absolute instead of gage pressures, thus allowing a positive margin of 34 ft. of water at sea level.

A similar analysis for the discharge line (Fig. 2) leads to the expression for discharge pressure head analogous to Equation 2:

$$\frac{P_D}{\rho} = \left(Z_2 + \frac{P_2}{\rho} + F_D\right) - \frac{u_D^2}{2J} \quad (3)$$

where

F_D = all frictional losses in the discharge line

u_D = discharge line linear velocity, and

P_D = pump discharge pressure

The quantity, $Z_2 + \frac{P_2}{\rho} + F_D$, is defined as the "discharge head," h_D, and it is equal to the pressure head measured at the pump discharge corrected to suction flange datum plus the velocity head in the discharge line.

On suction and discharge lines that terminate below the liquid surface, the static heads are measured from the datum to the fluid surface in the storage tank. If the discharge line is open—does not discharge below the liquid surface—then the velocity head at the point of discharge must be taken into account in the energy balance. With siphon loop discharge lines, the normal pumping work requirement is based on the level in the discharge tank or the open end of the siphon line, for closed or open discharge lines, respectively. However, the starting horsepower requirement must be based on the highest fluid level in the siphon line. Generally, the head-capacity characteristics of a centrifugal pump are such as to satisfy any reasonable increase in head requirement over designed operating head demand at the temporary expense of fluid capacity, but a check should be made to see if the head required to start the siphon is within the capabilities of the pump.

*University of Texas, department of chemical engineering.

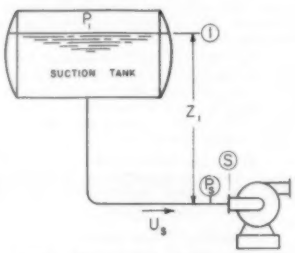

FIG. 1—Pump suction-line quantities.

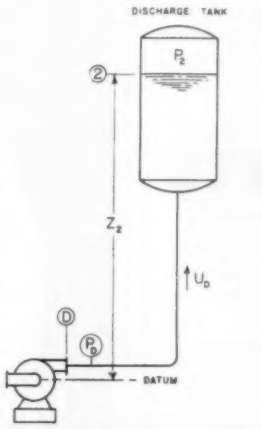

FIG. 2—Pump discharge-line quantities.

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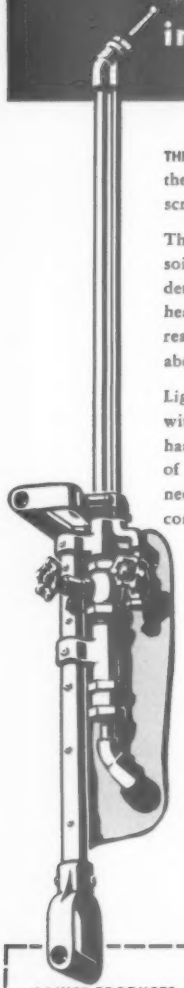

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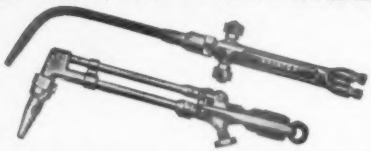

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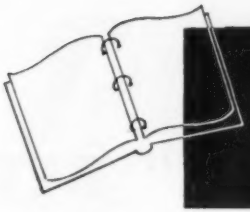

REFINER'S NOTEBOOK

ELECTRICAL INSTALLATIONS—8

Breathers and Drains

by B. Z. Segall*

WHERE any part of a system is sealed off as required by the code sealing requirements, the free circulation of air is stopped within this part of the system. This causes water vapor in the entrapped air to condense out of the air and accumulate within the enclosures and on the equipment within these enclosures. After a time, this water will corrode the equipment parts and also cause the housing itself to deteriorate and become hazardous. Improperly drained systems have been known to "rot out" in a period of a few months.

The condensed water vapor in itself will have a marked deleterious effect on the metal of the wiring system. In many installations, however, other vapors, dusts, fines, etc., are present and these combining with the water will produce acids and alkalies which will have even a greater eroding effect on the metal parts of the wiring system.

What causes this condensation? . . . Water vapor is one of the constituents of air. The amount of water vapor in the air depends upon the temperature of the air. As a high temperature the air can "absorb" more water vapor than it can at a lower temperature.

Assume that the air is at a relatively high temperature and is not saturated with all the water vapor it is capable of holding at that temperature. In other words it is relatively dry air. Suppose we cool the air down. This would be analogous to the air say in a circuit breaker enclosure which has just been tripped to the "off" position. The current flowing through the circuit breaker produces heat due to the heat losses caused by the resistances of the circuit breaker current carrying parts. Opening the circuit breaker stops the flow of current and naturally permits the air within the enclosure to cool down. If the air is cooled down to its "dew point" it will be saturated with water vapor.

Suppose the circuit breaker was opened in the daytime. As the sun sets, the ambient temperature will tend to decrease further and if the circuit breaker is still open, the entrapped air within the enclosure will be cooled to even a lower temperature. The air has already reached a point where it could not hold all its water vapor, so that now some of this excess water vapor is "thrown out." This condensed water vapor will accumulate on the inner walls of the enclosures and on the various parts of the circuit breaker. If sufficiently cooled down, larger and larger beads of water appear and these will be heavy enough to flow off or drop off into the low point of the enclosure.

At the same time that the inner air is being cooled, its pressure is also reduced. This reduced pressure tends to produce a slight vacuum in the breaker enclosure. Due to this slight vacuum the outside air is "sucked in" or as usually termed, the air "breathes in." This outside air brings with it more water vapor which may add to the condensate already within the enclosure.

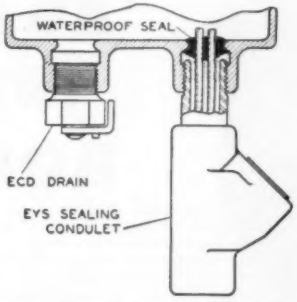

Fig. 1.—Illustrating use of a seal and drain for enclosure. (Crouse-Hinds Co.).

Now suppose the circuit breaker is closed. This will tend to heat the air within the enclosure. The warm air expands and being lighter than the cool air tends to rise within the enclosure and thus causes the air to circulate within the enclosure. The expanding air also increases the pressure within the enclosure and now tends to force the air out of the enclosure, or causes it to "breathe out." This in turn will force some of the water vapor out of the enclosure.

The breathing-in action does not balance out the breathing-out action. There is generally a larger amount of residue water left within the enclosure for each heating and cooling cycle.

For explosionproof systems, special draining fittings have been developed. In the oil type of drain fitting an additional valve is built into the drain to prevent oil leakage. The water will accumulate at the bottom of the enclosure since it is heavier than the oil. The drain valve must be periodically opened and drained till oil begins to appear in the drainage.

The water-type drain fitting will automatically continuously drain off the water. It should be periodically operated by means of the lower handle to be sure that the labyrinth is not clogged with any foreign matter.

Fig. 1 indicates the use of a seal and a drain for an enclosure. The combination as shown assures an explosionproof setup for the equipment.

The use of a drain alone will not completely solve this problem of removing the condensate from the electrical system. There must be provided some means to permit the warmer, moisture-laden air in the upper portion of the enclosure to escape to the outside atmosphere. A breather accomplishes this. One type of breather is similar to the water drain in design and has a water-shedding cap in place of the operating handle. This cap serves the same purpose as the handle in that it can be used to rotate the labyrinth manually.

*Consulting engineer, New Orleans.

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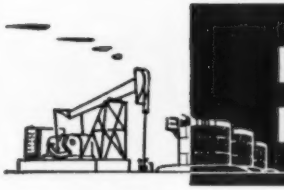

Effect of Economic Factors on Pipe-Line Design

by Ralph F. Nielsen*

CERTAIN basic features of the design of a gas pipe line may be roughly estimated by relatively simple calculations. Such calculations are given here to illustrate how costs affect the design, using only orders of magnitude for the costs. These "costs" include initial equipment outlays spread over a time period.

Let it be supposed that 24 million standard cubic feet per day is to be transmitted 1,000 miles. Compression costs are assumed at ½ cent per horsepower-hour performed on the gas. Cost and maintenance of the line are assumed proportional to the diameter and, for a 1,000-mile line, equal to 10 d dollars per hour, where d is the diameter in inches. To further simplify matters, it is assumed that the compressors discharge at 800 psia.

Assuming isothermal compression of an ideal gas, the power requirements per station are:

$$Hp. = \frac{-RT \times 10^6 \times 4 \times 10^{-4} \ln r}{379}$$

$$= -1{,}000 \ln r \text{ (approx.)} \qquad (1)$$

where
R = 2
T = 520
379 = cu. ft. per mole
4×10^{-4} converts B.t.u. to hp.-hr.
r = reciprocal of the compression ratio

If s is the spacing of the compressor stations in miles, then, at ½ cent per horsepower-hour, the compression cost per hour is, in dollars:

$$1{,}000 (-5 \ln r + 0.5)/s \qquad (2)$$

where the constant 0.5 has been arbitrarily chosen to avoid the absurdity that for a compression ratio of nearly unity the station would cost practically nothing. The negative sign is necessary because r is less than one.

To find s in terms of d and r, one of the usual pipe-line formulas must be used. Weymouth's formula gives:

$$15{,}300 \frac{(p_1^2 - p_2^2)\, d^{5.33}}{GZTs} = 24 \times 10^6 \qquad (3)$$

taking:
G = 0.6; T = 520; Z = 1; $r = p_2/p_1$,

$$s = \frac{(1 - r^2)\, d^{5.33}}{1{,}200} \qquad (4)$$

The hourly cost is then given by:

$$\frac{1.2 \times 10^6 (-5 \ln r + 0.5)}{(1 - r^2)\, d^{5.33}} + 10\, d \qquad (5)$$

where r and d must be chosen so as to make the cost a minimum. This should be a minimum if the partial derivatives with respect to d and r are each equal to zero. Setting the derivative with respect to d equal to zero gives:

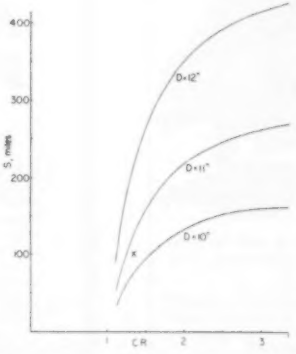

Fig. 1—Effect of compression ratio on the spacing of stations for three different pipe diameters, to handle 24 million standard cubic feet of 0.6°-gravity gas per day. X marks design calculated as most economical.

$$d = \left[\frac{-6.4 \times 10^5 (5 \ln r - 0.5)}{1 - r^2}\right]^{3/19} \qquad (6)$$

When the derivative with respect to r is set equal to zero the diameter drops out, giving:

$$1/r^2 + 2 \ln r = 1.2 \qquad (7)$$

This is equivalent to saying that the most economical compression ratio is independent of the pipe diameter and the cost of pipe. Equation 7 gives r = 0.75, indicating that the most economical compression ratio is 1.33. This corresponds, from the previous equations, to a pipe diameter of 10.5 in. and a distance of 100 miles between stations.

Fig. 1 shows a plot, calculated from Equation 4, of the distance between stations as a function of compression ratio and pipe diameters for the conditions of the problem. The X shows the most economical design for the assumptions made.

These simplified calculations are of course given only to illustrate the effect of economic factors. The quantity of gas and the maximum pressure determine the pipe diameter within rather narrow limits. The "best" compression ratio, which determines the spacing of the stations, depends on having the proper relation between this ratio and the cost of installing and operating a station. The use of the usual adiabatic compressor formula would give results little different from the isothermal formula. To arrive at the most economical ratio it is necessary to have reliable cost figures for stations designed to handle the required quantity of gas and to compress it in certain ratios.

Reference

High-Pressure Pipe-Line Research, Clark Bros. Co., Inc., Olean, N. Y.

*Associate professor, petroleum and natural-gas engineering, Pennsylvania State College.

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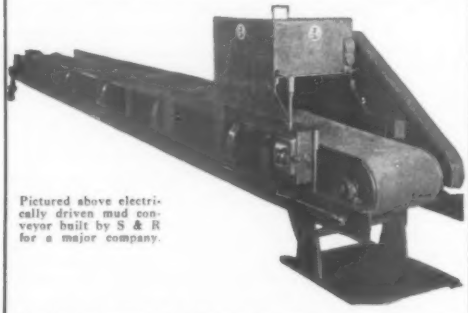

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The Oil and Gas Journal
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QUESTIONS ON TECHNOLOGY

Sulfur Content of Cracked Products

3—CATALYTIC CRACKING

Note: Continuation of S.M.T.'s question of November 10, 1952.

The sulfur content of products when cracking West Texas feed November 10. Charts were shown for both catalytic and thermal cracking. Little difference in the sulfur content was caused by the two types of cracking but, of course, much sulfur is eliminated in the coke and gas during catalytic cracking.

The sulfur content of thermally cracked products from various crude oils was discussed in the November 24 issue. With respect to stability of sulfur compounds during thermal cracking, it was found that the Middle East sulfur compounds are most stable and those in Mexican and California stocks are least stable.

Fig. 1 shows the sulfur content of catalytic gasolines and catalytic cycle stocks. Again (from sulfur balances) the sulfur compounds found in California stocks appear to be most stable, but under conditions of catalytic cracking the Wyoming and Miscellaneous (Mid-Continent, Pennsylvania, Illinois, East Texas, Gulf Coast and Michigan) stocks are least stable. Arkansas stocks[15 19] (not shown) appear to be similar to Wyoming or Venezuelan stocks. Although the behavior of stocks reported here with respect to sulfur compound stability may be dependable, it should not be inferred from the groupings that the stocks in each group are similar to each other in other respects.

Most approximately the low-boiling cycle stocks (500° F. midpoint) contain about two-thirds as much sulfur as the total cycle stock, and the high-boiling cycle stocks (700° F.) about one-third more. There are, however, many exceptions and although an increased "percentage conversion" reduces the sulfur content of the cycle stock, its boiling point is usually much lower. This sometimes results in low-boiling cycle stocks of relatively high sulfur content. There is also some indication" that the lowest boiling point of a cycle stock contains large amounts of sulfur.

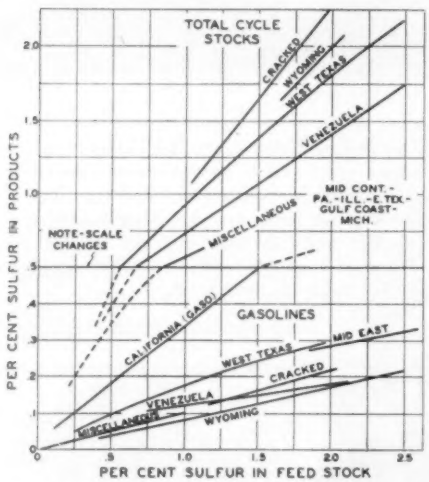

Fig. 1—Sulfur content of catalytic products as a function of feed-stock sulfur.

by W. L. Nelson
Technical Editor

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References to Reclaiming or Rerefining Lubricating Oils

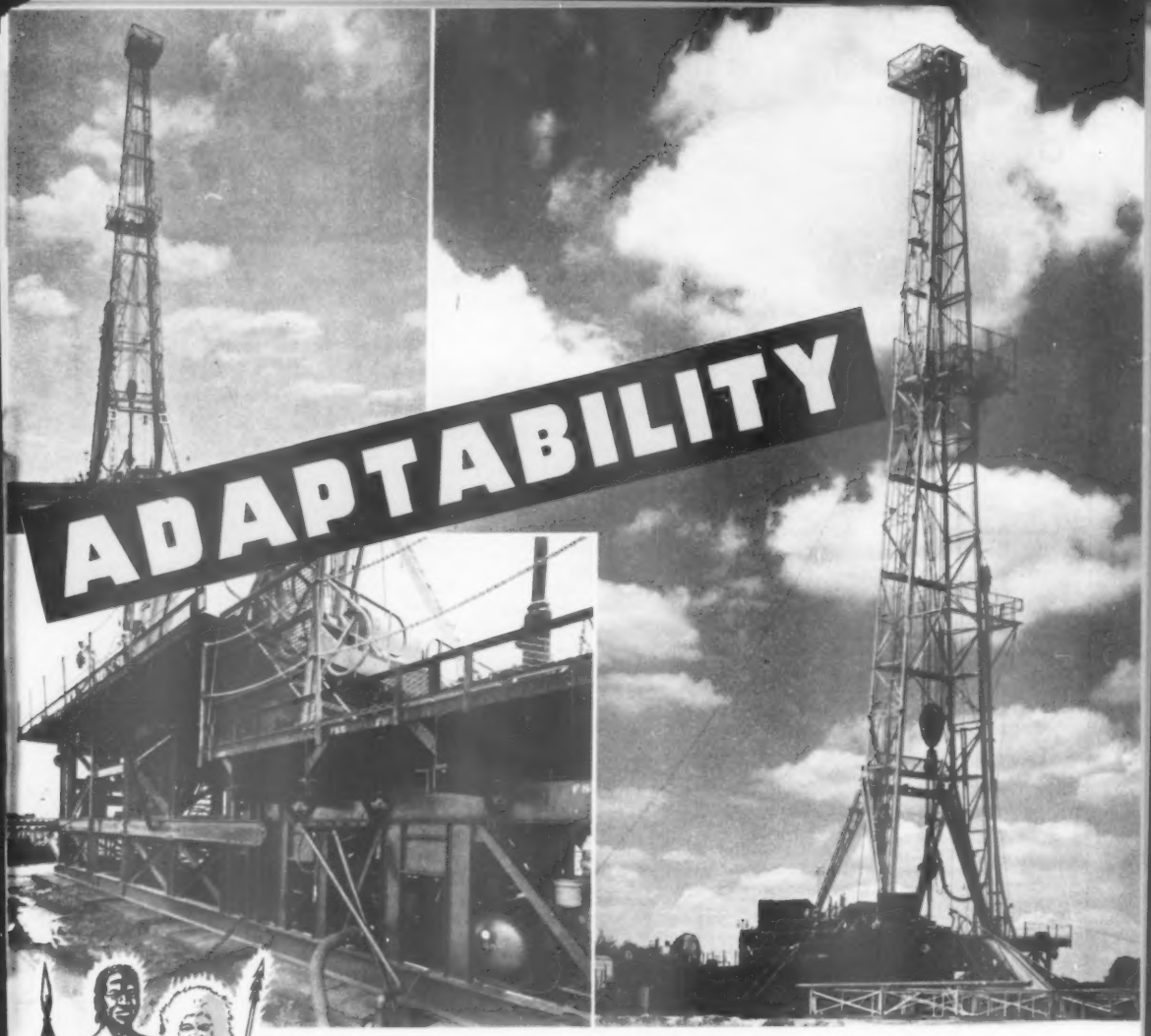
"I have been looking unsuccessfully for literature concerning the regeneration of used lubricating oils. I hope you can indicate sources of information. If only color, flash, and viscosity (S.A.E. 30) are important and if the oil is to be used for grease manufacture, what do you suggest?"—E. B.

The following are discussions that have appeared on the Questions on Technology page of The Oil and Gas Journal:

1. C. K. Francis—17 questions answered prior to 1940 (see Reference 3 below which lists the dates of these questions).
2. Reclaiming Oil, Again—Part 1—March 31, 1949, p. 123.
3. Reclaiming Oil, Again—Part 2—April 7, 1949, p. 104.
4. Grease Spoils Oil for Rerefining—July 26, 1951, p. 349.

Reference 3 above lists a total of 32 references. William J. O'Connell recently published "Oil Reclaiming Systems, Parts 1 and 2," Plant Enginering, May 1952, page 98 and June 1952, page 88.

Recommendations cannot be made except in a most general way. In reclaiming oil for grease manufacture, it would seem that heating, stripping with steam, introducing decolorizing clay, and filtering would be all that would be required. The filtering should be done in two filters, using the second filter only for traces of the smallest particles.



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Know Your Rope Fittings—2

by Walter C. Richards*

THIS subject was initiated in the last installment of Modern Drilling. Wire-rope sockets and bridge sockets were discussed, and tables giving general properties of fittings were presented at that time.

Compression fittings (Fig. 5) are attachments into which the rope is inserted and secured by cold flowing of the surrounding steel under heavy pressure. Here again, the properly attached fitting will hold securely until the rope breaks. All fittings of this type must be factory attached.

A wedge socket (Fig. 6) is a fitting whose body is tapered in one direction and flat in the other—both lengthwise of the rope. The hollow bowl within this body is of the same shape. The rope is secured in place by passing it around a grooved, wedged-shaped piece of steel and drawing the rope and wedge down into the bowl.

This socket finds wide use, particularly on excavating equipment, as it has the advantage of being readily removable, and may be re-attached easily in the field. While this fitting will not develop the full breaking strength of the rope, the ropes on which it is used are generally subject to more or less rapid deterioration. Thus the weakest spot in the assembly would then be somewhere along the rope rather than in or near the socket.

The reason this socket will not develop the full strength of the rope is that, at the bend of the rope around the wedge, there is a certain binding which will cause a new rope to fail at this point when loaded to capacity. Vibration is also more or less suddenly stopped by this socket, and progressive failure of the wires results. But it is not quite as severe as with the preceding types of fittings, and the wire breaks may extend over a greater distance.

Many rope ends are attached to their respective anchorages by clips (Fig. 7) or clamps (Fig. 8).

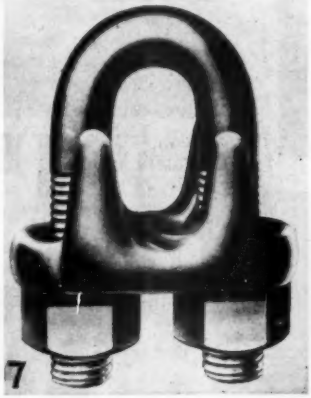
The rope is passed around thimbles, which protect the rope in the loop, and the short end is then clipped back on itself (Fig. 9). A certain number of clips is used at specified intervals, as recommended by the clip manufacturers and concurred in by wire-rope manufacturers.

Clips are usually of the single U-bolt and saddle type. Clamps comprise a pair of steel castings or forgings with two grooves to match the diameter of the rope and fastened with three or four bolts. With clips, the rope is subjected to a certain amount of crushing. The same is true of clamps, though they are a little less damaging. There is also, in either case, a tendency for the rope to slip through the fittings if they are not tightened up once or twice after the initial load is placed on the rope.

The advantages of such fittings are ease of application in the field, and the fact that the bad effects of vibration are dissipated gradually rather than suddenly as in the case of zinc-attached sockets. Progressive wire failures caused by vibration are not entirely prevented, however. And in certain ropes subject to very severe vibration, such a condition develops, resulting in broken wires under the first and sometimes the second clip or clamp. In such cases, inspection is difficult.

*Wire Rope Technical Board, composed of engineers and technical representatives from each of the wire-rope manufacturers in the United States. Richards is a member of the board and is chief engineer of A. Leschen & Sons Rope Co., St. Louis.

6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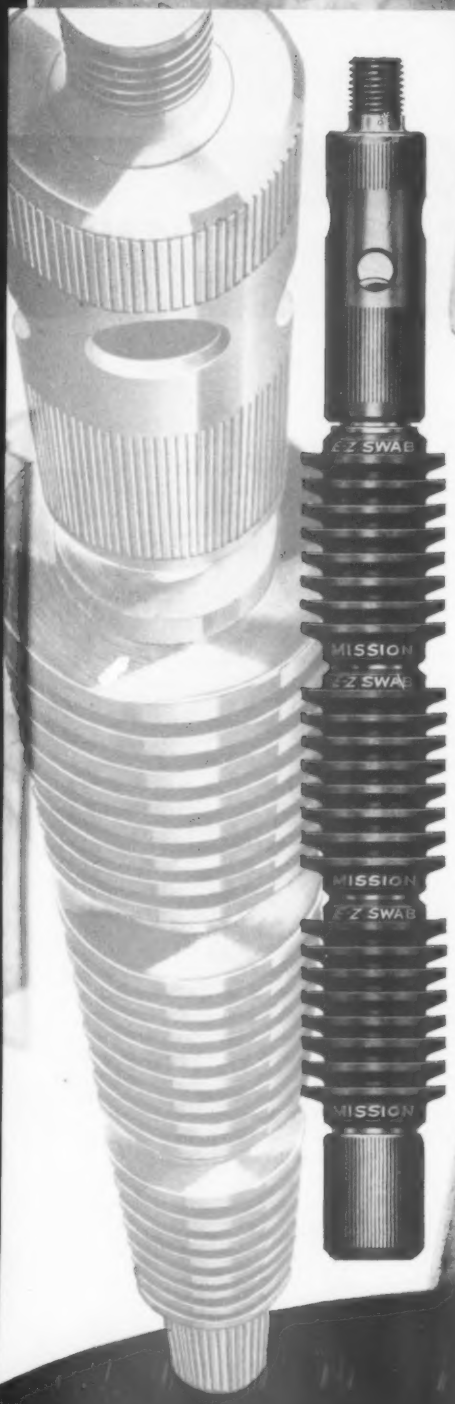

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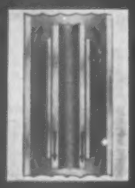
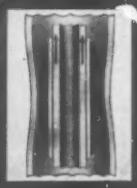
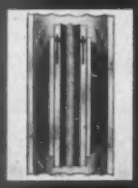


On the down stroke fins are in normal upturned position, allowing E-Z Swab to fall free.

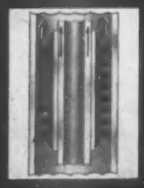
Flexibility of fins allows EZ Swab to pass smoothly through tight spots on up or down stroke.





E-Z Swabs automatically by-pass fluid overload. Each rubber will lift approximately 400 feet of fluid. Rubber fins bend down and unload excess fluid.

After overload fluid is passed, fins spring up and seal against tubing.

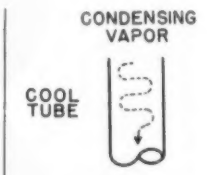


Part 15 of a series

by Dr. B. E. Lauer, Head, Department of Chemical Engineering, University of Colorado

h_f HEAT TRANSFER

COEFFICIENT of HEAT TRANSFER through FILM between INSIDE SURFACE of a COOL TUBE and CONDENSING VAPOR



Tube Position: Vertical

Vapor Movement: Turbulent

EQUATION:

$$h_f = .007 \left[\frac{4\omega}{\mu\pi D}\right]^{.4} \left[\frac{k^3 \rho q}{\mu^2}\right]^{.33}$$

TERMINOLOGY:

h_f - Heat transfer coefficient, BTU/hr. sq. ft. °F.

k - Thermal conductivity of condensate at t_f, BTU/ft. hr. °F.

ρ - Density of condensate at t_f, lbs./ft.^{3}

q - Gravitational acceleration, 4.18×10^8 ft./hr.^{2}

μ - Absolute viscosity of condensate at t_f, lbs./ft. hr.

C - Specific heat of condensate, BTU/lb. °F.

ω - Mass rate of flow of condensate from lowest point on condensing surface, lbs.

D - Diameter of tube, ft.

t_f - $T_{sv} - 3/4\ (T_{sv} - T_s)$

T_{sv} - Temperature of saturated vapor, °F.

T_s - Temperature of surface, °F.

LIMITATIONS: Equation limited to above case for Reynolds number greater than 2100, and vapors of substances existing in liquid state at ordinary conditions.

PHYSICAL CONSTANTS: The values of the physical constants such as density, viscosity and others are reported in the International Critical Tables, in several handbooks, and in the technical literature.

Page references in the Chemical Engineers' Handbook, J. H. Perry (1948) are as follows:

for ρ - see pp. 130-148, 178-198, 1863.
μ - see pp. 370-374, 1198, 1896.
k - see pp. 459-461, 1303, 1897.
C - see pp. 225-235, 297, 1588, 1896.

REFERENCES:

1. A. P. Colburn, Trans. A. I.Ch. E., Vol. 30, pp. 187-193, (1934).

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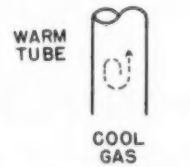
E 3 a

COEFFICIENT of HEAT TRANSFER through FILM between INSIDE SURFACE of WARM TUBE and COOL GAS



Tube Position: Vertical

Gas Movement: Natural Convection.

EQUATION:

$$h_f = 0.128 \left[\frac{k^2 \rho^2 \beta C q \Delta t}{\mu}\right]^{\frac{1}{3}}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr. sq. ft. °F.

k - Thermal conductivity of gas at t_f, BTU/hr. ft.^{2} °F./ft.

ρ - Density of the gas at t_f, lb./cu. ft.

q - Acceleration of gravity. 4.17×10^8 ft./hr.^{2}

β - Coefficient of volumetric expansion of gas at t_f [for ideal gas is equal to $1/^\circ$R. (cu. ft./cu. ft.)/ °F.

Δt - Temperature difference between wall and gas, °F.

μ - Viscosity of gas at t_f, lb./ft. hr.

C - Specific heat of gas at constant pressure, BTU/lb. °F.

t_f - Film temperature, assumed as arithmetic average of wall temperature and bulk gas temperature, °F.

LIMITATIONS:

The above equation can be used on the assumption that gases obey perfect gas laws, $pV = RT$. Low velocity or natural convection only.

SOURCES OF DATA:

For physical constants for use in above equation see Chemical Engineers' Handbook, J. H. Perry (1948).

for ρ -- see pp. 130-148, 178-198, 1863.
μ -- see pp. 370-374, 1198, 1896.
β -- see p. 200-202.
k -- see pp. 459-461, 1303, 1897.
C -- see pp. 225-235, 297, 1588, 1896.

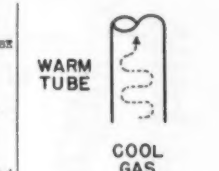
REFERENCES:

1. Applied Heat Transmission, J. H. Stoever, p. 60 (1941).

2. Colburn and Hougen, Ind. Eng. Chem., 22, 522 (1930).

E 4 a

COEFFICIENT of HEAT TRANSFER through FILM between INSIDE SURFACE of a HEATED TUBE and COOL GAS



Tube Position: Vertical

Gas Movement: Parallel - Turbulent.

EQUATION:

$$h_f = 0.0243 \frac{k}{D} \left[\frac{DV\rho}{\mu}\right]^{0.8} \left[\frac{C\mu}{k}\right]^{0.4}$$

TERMINOLOGY:

h_f - Coefficient of heat transfer, BTU/ft.^{2} hr. °F.

D - Inside diameter of tube, ft.

k - Thermal conductivity of gas, BTU/ft. hr. °F.

V - Velocity of gas, ft./hr.

ρ - Density of gas, lbs./ft.^{3}

μ - Absolute viscosity of gas, lbs./hr. ft.

C - Specific heat of gas, BTU/lb. °F.

p - Pressure of gas in lb./sq. in. ga.

LIMITATIONS:

(ρV) min = $1{,}650p^{0.645}$ where p is the pressure of the gas in psig, and the Reynolds number ($DV\rho/\mu$) must be greater than 2100. Properties taken at average temperature of gas. Low Reynolds number of 2100 to 10000 satisfactory if $(C\mu/k)$ is less than 10.

SIMPLIFIED EQUATION:

$$h_f = 0.0144 \frac{C(V\rho)^{0.8}}{D^{0.2}}$$ all gases.

SOURCES OF DATA:

For physical constants for use in above equation see Chemical Engineers' Handbook - J. H. Perry (1948).

for ρ -- see pp. 130-148, 178-198, 1863.
μ -- see pp. 370-374, 1198, 1896.
β -- see p. 200-202.
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C -- see pp. 225-235, 297, 1588, 1896.

REFERENCES:

1. P. W. Dittus, and L. M. K. Boelter, Univ. of Calif. Pub. in Eng. 2, 443 (1930).

2. Applied Heat Transmission, H. J. Stoever, p. 57, (1941).

3. Heat Transmission, W. H. McAdams, p. 167-175.

4. Introduction to Heat Transfer, Brown and Marco, p. 90-91 and p. 100-101, (1942).

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THE OIL AND GAS JOURNAL
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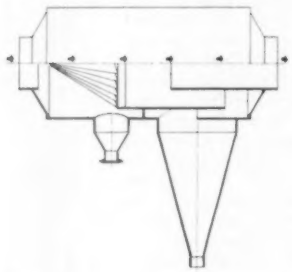
TULSA, OKLAHOMA

OIL AND GAS EQUIPMENT Digest

IT'S NEW ✓ CHECK IT

by Dan B. Miller

21 CENTRIFUGAL-TYPE CATALYST DUST SEPARATOR. The design is used for separation encountered in catalytic hydrocarbon cracking processes utilizing reactors, elutriators, and regenerators and also for external service on lines or ducts. Test results with the CD unit of over 95 per cent separation efficiency at relatively low loadings have been obtained using catalyst dust passed by an electrostatic precipitator. This dust was composed of particles composing approximately 50 per cent by weight of the dust mass were less than 5μ in size. In the Type CD external design the shell through which the gas flows is in a horizontal position. The tuyere gives the total mass of gas carrying the entrainment a rotary motion of such magnitude the entrained particles are carried to the outer periphery of the revolving mass and discharge pipe while the dust is trapped and led off through a hopper which forms part of the unit. The internal separators for use in large vessels such as fluid catalyst reactors and regenerators, are basically the same. In this instance a number of shell barrels consistent with flow requirements are grouped around a central outlet with a hopper bottom. Hopper discharge legs from the various units and center are led down into, and sealed off by the catalyst bed. This returns all of the extracted catalyst to the main body. *Centrifix Corp.*



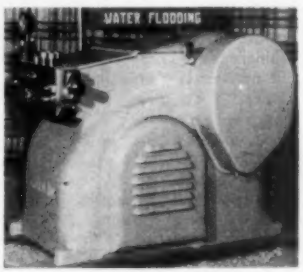
IT'S NEW ✓ CHECK IT

22 AERO COMMANDER MODEL 520. Deluxe appointments, roomy cabin, and forced-air ventilating and heating make this five or six-place, tricycle gear, high-wing, dual-controlled plane ideal for executive crosscountry flying. The large cabin allows a variety of seating arrangements to suit the needs of the owner. High cargo capacity makes the plane a valuable asset for fast delivery of parts and equipment. CAA approved gross weight is 5,500 lb.

and empty weight is approximately 3,640 lb. Its tanks have a fuel capacity of 145 gal. Two geared Lycoming GO-435-C2 air-cooled engines with a maximum continuous rating of 240 hp. at 3,000 r.p.m. give it a cruising speed of 197 m.p.h., using 70 per cent of sea level power. Takeoff distance over a 50-ft. obstacle, with no wind, is 950 ft. Range with standard fuel capacity at 60 per cent power and allowing 30-minute reserve is 1,150 miles. Service ceiling, two engines, is 24,000 ft. Service ceiling, one engine feathered, 10,500 ft. *Aero Sales Co.*

IT'S NEW ✓ CHECK IT

23 HORIZONTAL TRIPLEX PUMPS. These units are rugged, heavy-duty machines that reduce operation, inspection, and maintenance costs to a minimum. The horizontal design makes every part easy to get at. Its ceramic plungers cannot be corroded by salt water or other deteriorating elements usually encountered in oil-field service. These units are particularly adaptable to water flooding and salt-water-disposal operations and for single and multiple-well hydraulic pumping. Four models offer a range in capacities of from 25 to 75,000 bbl. per day. Plunger sizes and drive speeds may be easily changed or varied in the field, offering a wide volume and pressure range. Removal of two gasketed



The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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plates exposes the whole drive and plunger assembly for inspection and maintenance. *Manton Gaulin Manufacturing Co., Inc.*

IT'S NEW CHECK IT

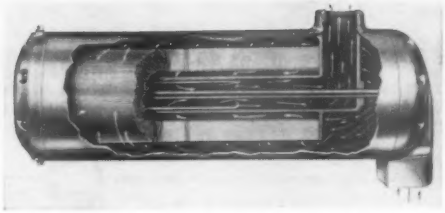
24 NEW SAND LINE CUTTER for use inside casing. This tool is for use inside 5, 5½, and 7-in. casing. It can be used with slight modification to cut stuck sand line inside tubing as well. It is simple and dependable in operation. The tool rides the line into the hole. A go-devil is then dropped onto it, setting off a charge which cuts the line and crimps it for easy removal of the cut line and tool. If for any reason the cutter is not recovered on the end of the cut line, the tool has been designed for easy fishing. *M. M. Kinley Co.*

IT'S NEW CHECK IT

25 ALL-PURPOSE PYRENE FOAM is effective against all flammable liquid fires, such as gasoline and benzene as well as in water-soluble solvents. Its effective life is almost 50 times greater than that of other foams regarded as stable. Because the alcohol-resistant foam covers an extinguished fire for hours afterward with a protective blanket, it prevents reigniting, not uncommon in volatile liquids. The new product makes foam bubbles which are immune to the affinity the alcohols and other water-soluble solvents, ethers, esters, and keytones, have for water, an affinity which destroys ordinary foam as fast as it is laid on a fire. The new foam has excellent adhesion, clinging well even to hot vertical surfaces. Although less fluid than other foams, it is somewhat elastic. It has complete resistance to breakdown by solvents. Cut a hole in a covering of the foam and ignite alcohol below and there will be no breakdown of the foam at the burning edge. *Pyrene Manufacturing Co.*

IT'S NEW CHECK IT

26 MICRONIC FILTER especially designed for hydraulic systems is designed for mounting within the oil tank or reservoir, with removable head exposed. A builtin shutoff valve permits filter replacement without draining the tank. Standard replacement filters are used. The unit may also be mounted externally. Operating features include high flow rate with minimum pressure drop. Tests with a 25μ filter on 210 S.U.s. oil at 90° F. indicate a flow of 24 g.p.m. with a pressure drop of only 1 psi. The unit is 25½ in. long over-all, and 8 in. in diameter.



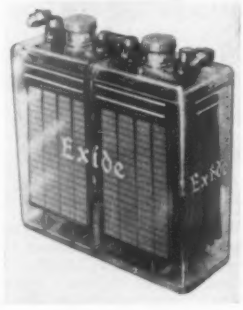
Inlet and outlet connections are 2-in. pipe size. *Rucker Manufacturing Co.*

IT'S NEW CHECK IT

27 NEW PACKER eliminates the common cause of packer failures at four critical steps. Slightly smaller in diameter than most packers, the new packer runs in without difficulty and goes right through tight spots. Large fluid bypass areas permit fast running and premature setting is eliminated by the automatic clutch. Rugged construction prevents damage when running through tight places or foreign matter. Left-hand rotation is not required in setting the packer. Two turns to the right release the automatic clutch for setting and the clutch relatches when the tubing is raised. All working parts are completely enclosed to eliminate fouling from foreign matter and to assure positive setting. The packing element requires only small longitudinal compression to pack-off, resulting in longer compressed length with minimum distortion. Enclosure of all working parts within the housing eliminates difficulty in pulling since parts cannot come out and wedge between the packer and casing. Working surfaces are machined to a smooth finish and the slip-cones are hard chrome plated to protect against corrosion and to prevent slip seizure. *Oil Center Tool Co.*

IT'S NEW CHECK IT

28 TYPE COE BATTERY. A new line of two-cell and three-cell industrial batteries in transparent plastic containers is for stationary small power applications. These batteries combine highly sustained useful voltages and long trouble-free life with greatly reduced operating and maintenance costs. The battery is designed to eliminate the need for wood trays and their inherent cleaning problems and to allow complete flexibility of installation, using standardized interunit connectors. The permanent bond between containers and covers assures that no electrolyte will leak from the battery during its service life. The batteries are equipped with colored pilot balls which indicate at a glance the state of charge. Solution-



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You can set it, pull it, re-set it—because Guiberson formation packers have that all-important feature of being easy to pull. They break their positive pack-off and come out clean, without swabbing, when you pull the tubing.

This combination of positive pack-off and easy pulling makes Guiberson formation packers ideal for open hole use in holding gas pressure, testing formations, boosting flowing well production, acidizing, re-pressuring or various work-over operations. Where other packers fail —Guiberson gets the job done!

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Type "A" is a single-rubber open-hole formation packer keyed against rotation in all positions.

Type "B" is similar to Type "A" except that a valve is incorporated. Valve is held open by sheer plugs running in; opens automatically when pulling.

Type "C" is a two-rubber packer with more than 50 inches of rubber to assure positive pack-off in even the roughest hole. Valve-equipped.

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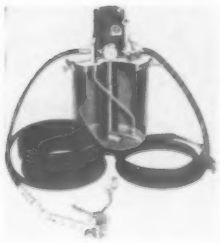
level lines marked on the containers show recommended upper and lower levels of electrolyte. *The Electric Storage Battery Co.*

IT'S NEW CHECK IT

29 FIRE-WALL DRAIN GATE. Designed expressly for fire-wall drains, the P-D Fire Wall Drain Gate is simple in design and easy to install. Featuring a hinged disk with an O-ring installed around the circumference, the gate provides a positive seal, is easy to open and close, and cannot be damaged or frozen by cold temperatures. All contact surfaces are cadmium plated to prevent rust and corrosion. Designed to hold several hundred pounds of pressure, P-D Fire Wall Drain Gates are installed by welding to the drain pipe. They are available in sizes to meet required specifications. *Maintenance Equipment Co.*

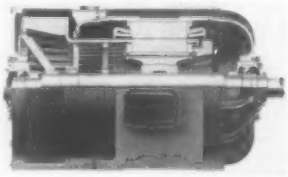
IT'S NEW CHECK IT



30 6-V GREASEMASTER is a portable high-pressure greasing unit. Obtaining its power from conventional 6 or 12-volt vehicle batteries and weighing less than 40 lb. the Greasemaster cuts down greasing time as much as two-thirds on the normal greasing job. Twenty-five feet of 3,000-psi. hose, 10 ft. of electric connecting cable, and the incorporation of an automatic pressure switch enable this universal pressure gun to be used speedily and efficiently for positive lubrication on all types of equipment. *G & T Industries.*

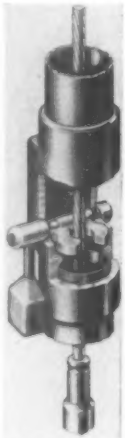
IT'S NEW CHECK IT

31 TYPE KRK MOTOR. A new totally enclosed, fan-cooled, high-slip induction motor, designed for use in acceleration of high-inertia loads such as punch presses, centrifuges, and hoists, is as much as 30 per cent smaller and 40 per cent lighter than conventional totally enclosed fan-cooled high-slip motors. The space and weight reduction is the result of the motor's new extended-bar design which provides efficient dissipation of the increased heat normally generated by high-slip motors. Low-resistance rotor bars are extended on one end and pass through a rotating baffle plate. Beyond the baffle plate, the bars are brazed to strips of high-resistance metal, shaped to form a radial-blade fan. These fan blades, themselves, provide the higher rotor resistance necessary for high-slip characteristics. Thus, most of the rotor heat develops where there is a direct transfer to the cooling air. Type KRK motor is available in 30 to 150 hp. at 900 and 1,200 r.p.m., 5-8 and 8-13 per cent slip. Voltage ratings are 220, 440, and 550. *General Electric Co.*



IT'S NEW CHECK IT

32 BOWEN LUBRICATOR TOOL TRAP is comprised of a housing containing a floating stop. The trap screws into position between the lubricator and the well head. On withdrawing tools, should the line pull out of the rope socket while the tools are within the lubricator, they are automatically caught by the trap. A hinged stop has an opening considerably larger than the wire line which passes through it, but smaller than the tools which are being run. When the handle is down, this stop is free to swing on the shaft, thus offering no resistance to a string of tools being pulled into the lubricator. As soon as the tools have cleared the trap, the stop will fall into a horizontal position acting as a trap to catch the falling tools before they leave the lubricator. When runnning tools into the hole from the lubricator, the trap is opened by a crewman by simply raising the handle. When the handle is returned to its down position, the stop will fall to a horizontal position. The trap is simple to install, is ruggedly constructed, and the stop is made of tough manganese bronze. The shaft is completely sealed by the use of O-rings. *Bowen Co. of Texas.*



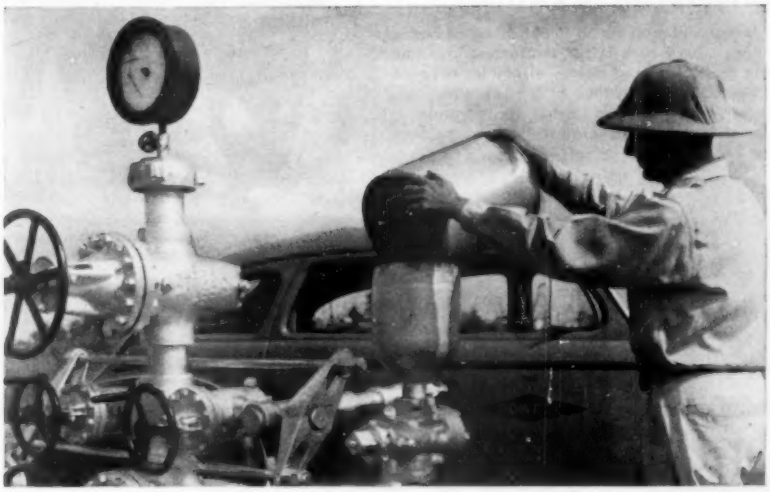
IT'S NEW CHECK IT

33 NEW OSCILLOGRAPH records under extremes of shock and acceleration. This new instrument is capable of making 12 simultaneous records, although the width (less mounting flanges) is only 4⅞ in. Its height is 5 in. and length is 7 in. Weight is 8¼ lb. without film. Recording film width is 3½ in., length 40 ft. Some important features of the instrument, in addition to its ability to record under extreme shock and acceleration conditions, include: rugged cast-aluminum case and magazine with mounting flanges cast integral with ease; choice of three film speeds; 12-channel magnetic assembly with facilities for mounting damping resistors for each channel inside oscillograph; all operating controls and viewing screen accessible from one end; large variety of galvanometers available for use, undamped natural frequencies up to 3,500 cp. *Midwestern Geophysical Laboratory.*

IT'S NEW CHECK IT

DOWELL PARAFFIN SOLVENT HELPS BOOST PRODUCTION

Effective Removal of Deposits Demonstrated Through Application of Proved Products



There was a time when an accumulation of paraffin in a well or lead line presented an almost insurmountable obstacle to an operator. Its removal was expensive in time, money and manpower.

This, of course, was before Dowell entered the picture. Today, Dowell Paraffin Solvents dissolve these paraffin accumulations quickly and help restore operating efficiency at minimum expense.

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Results like this are why more and more operators every day think *first* of Dowell whenever they have a paraffin problem. How about you? Next time paraffin slows you down, be sure to wash away your problem with Dowell Paraffin Solvents. You can be sure you will get the specific solvent that will do your job best at your nearby Dowell station or the many supply stores throughout the oil country which stock Dowell Solvents. For information on how to use Dowell Solvents most effectively, write for your free copy of The Dowell Solvent Handbook.

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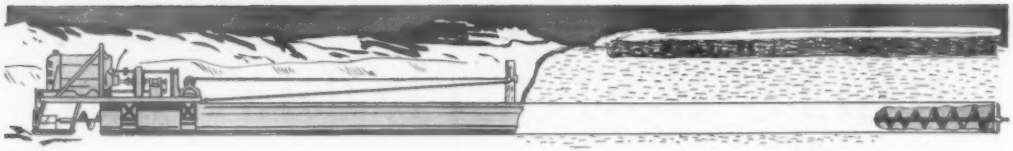

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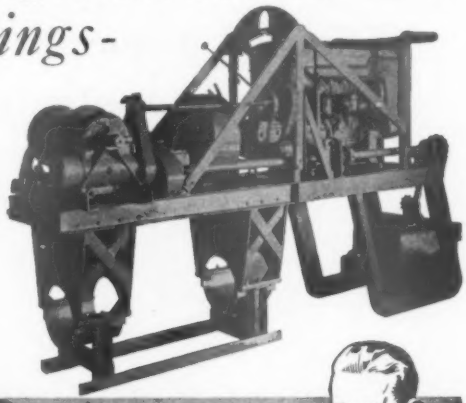

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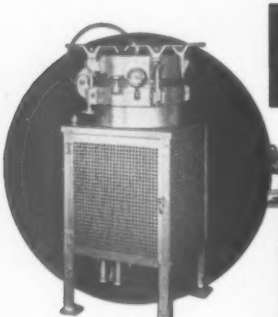
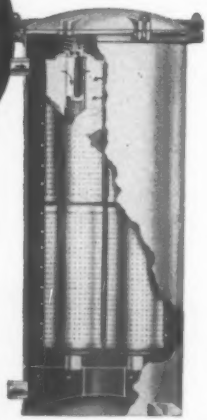


OIL RECLAIMER



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PIPE LINES

Oil Movement Up

Major lines carry 6 per cent more in third quarter

WASHINGTON. — The major pipe lines of the country handled 6 per cent more oil and had 12.2 per cent more revenue in the third quarter of this year than in the corresponding period in 1951.

Reports to the Interstate Commerce Commission from the 53 largest companies showed an aggregate movement of 848,586,905 bbl. during the quarter against 800,120,659 bbl. last year and a total transportation revenue of $138,596,774 against $123,491,917.

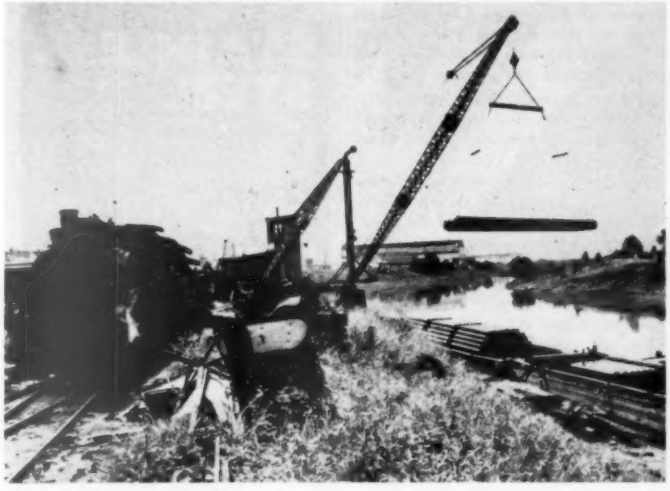
The survey shows 15 companies reported a decline in the volume of oil moved, 13 reported a decrease in revenue. However, five companies showed increased revenues despite a drop in volume, and three reported a revenue loss despite a heavier movement.

Volumes . . . More than half of the total volume of the 53 companies was handled by 10 pipe-line systems, reporting their traffic as follows:

Humble Pipe Line Co., 70,874,484 bbl. against 77,524,731 bbl. last year; Texas Pipe Line Co., 55,738,934 bbl. against 51,710,051 bbl.; Buckeye Pipe Line Co., 51,893,623 bbl. against 43,119,164 bbl.; Gulf Refining Co., 49,964,822 bbl. against 48,444,600 bbl.; Service Pipe Line Co., 48,727,446 bbl. against 44,027,256 bbl.; Interstate Oil Pipe Line Co., 46,718,185 bbl. against 44,444,685 bbl.; Sinclair Pipe Line Co., 43,313,750 bbl. against 41,479,030 bbl.; Magnolia Pipe Line Co., 43,077,395 bbl. against 43,603,205 bbl.; Ohio Oil Co., 39,215,840 bbl. against 35,350,792 bbl., and Shell Pipe Line Corp., 35,759,825 bbl. against 35,585,687 bbl.

Revenues . . . All but two of these companies also ranked in the first 10 firms as to the largest transportation revenue. These two, Buckeye and Ohio Oil, were replaced by Great Lakes Pipe Line Co., and Phillips Pipe Line Co. Taking in the most revenue, in order, were:

Service, $16,094,940 against $14,105,238 last year; Humble, $10,427,963 against $11,095,230; Sinclair, $9,739,812 against $9,082,063; Great Lakes, $9,332,202 against $6,840,978; Texas, $8,943,511 against $7,596,546;



River Voyage Ended

Nearly half of the 67,000 tons of pipe needed for construction of Texas Gas Transmission Corp.'s 408 miles of 26-in. loops from Bastrop, La., to Jeffersontown, Ky., was floated by barge down the Ohio River directly from the McKeesport, Pa., mill of the National Tube Division of United States Steel Co. to river-rail terminal facilities at Evansville, Ind., and Memphis, Tenn. The pipe then was loaded on flat cars and carried the remaining short distance to the construction sites. The barges used on the river leg, if lashed end to end, would have formed a tow more than 3 miles long. The equivalent of a 25-mile train, more than 3,000 railroad cars, was required to carry the pipe the rest of the way. The pipe traveled about 550 miles by water to Evansville and almost 800 to Memphis.

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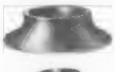
Also for pressure vessel heads



Nominal pipe sizes 1" to 24" — ASA B16.9 ASTM A234

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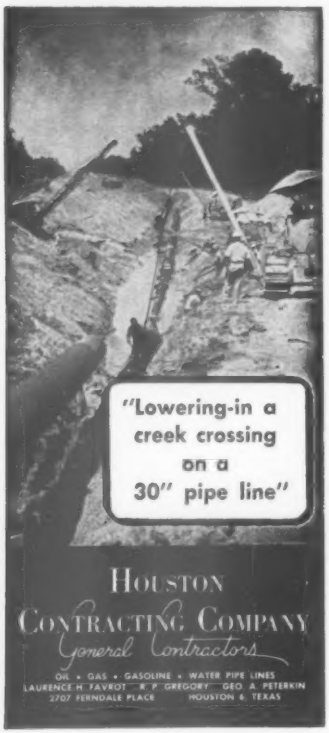

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Magnolia, $8,439,486 against $8,153,797; Gulf Refining, $8,179,636 against $7,637,996; Shell, $7,885,702 against $7,040,238; Interstate, $5,335,675 against $5,055,603; and Phillips, $5,294,662 against $4,024,441.

Sinclair Starts Work on Houston-Port Arthur Line

HOUSTON. — Construction was started last week on the first section of Sinclair Pipe Line Co.'s new 85-mile 12-in. products pipe line from the company's Houston refinery to Port Arthur.

The first section will comprise 40 miles of line. Specifications for bids on the remaining 45-mile section will be ready for mailing December 10, with work to get under way shortly thereafter.

The new 12-in. line, estimated to cost $3,000,000, is to be completed by the end of March. It will have a capacity of 54,000 bbl. daily and will connect near Port Arthur with the 16-in. Evangeline line now under construction between Port Arthur and Baton Rouge.

Big Platte Crude Line Now in Full Operation

CASPER, Wyo.—Millard Neptune, president of Platte Pipe Line Co., has announced that the big Platte crude line, undergoing tests for the past few weeks, now is in full operation.

First oil to reach Wood River, Ill., the eastern terminus, from Worland, Wyo., the starting point, arrived November 23.

The new line, owned jointly by Ohio Oil Co., Sinclair Oil & Gas Co., Pure Oil Co., British-American Oil Co., and Continental Oil Co., now is carrying 100,000 bbl. daily.

It will connect with other pipe lines at Salisbury, Mo., and Wood River which will carry the crude to refineries in the Great Lakes and eastern areas. Though some shipments will go as far as Falling Rock, W. Va., and Olean, N. Y., most of the crude will go to the Wood River, Chicago, Toledo, and Detroit areas.

The line will handle three grades of oil, batching low-gravity sour crude from the Big Horn and Wind River basins, sweet crude from eastern Wyoming and near Denver, and other crudes which have a sulfur content above the maximum permitted in the sweet stream but are free of hydrogen sulfide.

Operation of the Platte line, Neptune said, makes the Rocky Mountain

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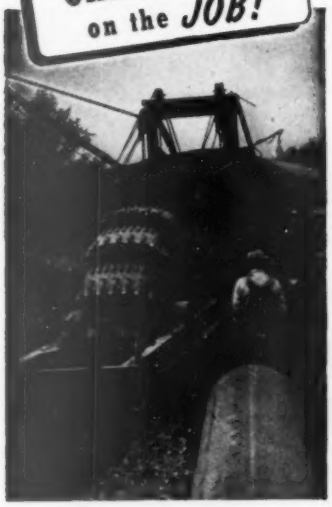

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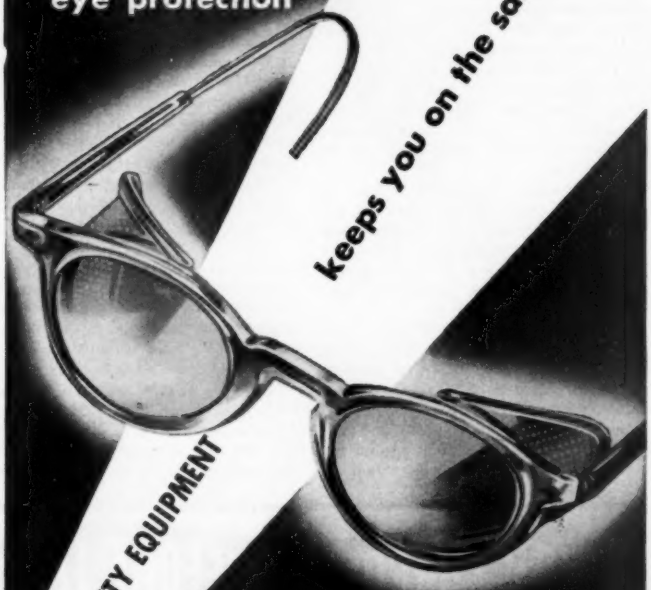

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region an important contributor to the nation's crude-oil requirements, instead of being held as a reserve for the future.

Utah Natural Plans Start On Gas Line to Salt Lake

SALT LAKE CITY.—Utah Natural Gas Co. has revealed that it is planning construction soon of a 96-mile, $6,500,000 natural-gas line from Clear Creek field near Price in eastern-central Utah to Salt Lake City.

Utah Natural said it has contracted with Three States Natural Gas Co. for gas in the Clear Creek area. It will transport the gas to Salt Lake City and sell it to Mountain Fuel Supply Co. for distribution.

Construction is expected to start as soon as a certificate is issued by the Utah Public Service Commission. The company hopes to complete the line by December 1, 1953. It has held a conditional construction permit for some time.

The line would consist of 18-in. from Clear Creek to Provo and 16-in. from Provo to Salt Lake. It would have an initial capacity of 50,000,000 cu. ft. daily which would be increased ultimately to 100,000,000 cu. ft. and possibly to 150,000,000. Hearings on the line are expected to be held in January or February, according to P. S. C. spokesmen.

Control of the company recently was purchased by El Paso Natural Gas Co., El Paso, Tex. Two-thirds of the outstanding capital stock went to El Paso in the transaction.

Algonquin Again Refused Permit to Operate Gas Line

WASHINGTON.—The Federal Power Commission has affirmed its October 31 order dismissing an application by Algonquin Gas Transmission Co., Boston, to allow it temporarily to continue construction and begin operation of its New England pipe-line system.

The commission, with two dissenters, again found that it did not have authority to grant Algonquin's request.

Algonquin asked FPC to reconsider its October 31 decision refusing to permit operation of the gas line, which now is virtually complete. At the rehearing, argument was confined to the single issue of whether the commission had the authority to take such action.

The vote by FPC was the same as at the October hearing, with Claude L. Draper and Nelson L. Smith contending that the commission should issue the authorization in the public interest.

Lone Star Nears Completion Of New Gas Line to Petrolia

PETROLIA, Tex. — Lone Star Gas Co. is nearing completion of construction of its new 70-mile, 20-in. natural-gas transmission line from the Golden Trend of Garvin County, Oklahoma, to this city in Clay County, North Texas.

The line will tie in at Lone Star's Petrolia compressor station with its main North Texas transmission system.

Pipe-Line Briefs

United Gas Pipe Line Co.'s application to lay about 31 miles of natural-gas line from a connection with a line now under construction in Terrebonne Parish, Louisiana, to Ship Shoal field in the Gulf of Mexico off the same parish has been denied without prejudice by an FPC examiner on grounds that reserves were not yet sufficient to justify building the line.

Fort Worth Basin Gas Co., organized by O. R. Smith, pipe-line contractor, and associates, is reported planning construction of a gas pipe-line system which would gather in the Brownwood, Tex., area and transmit to Fort Worth.

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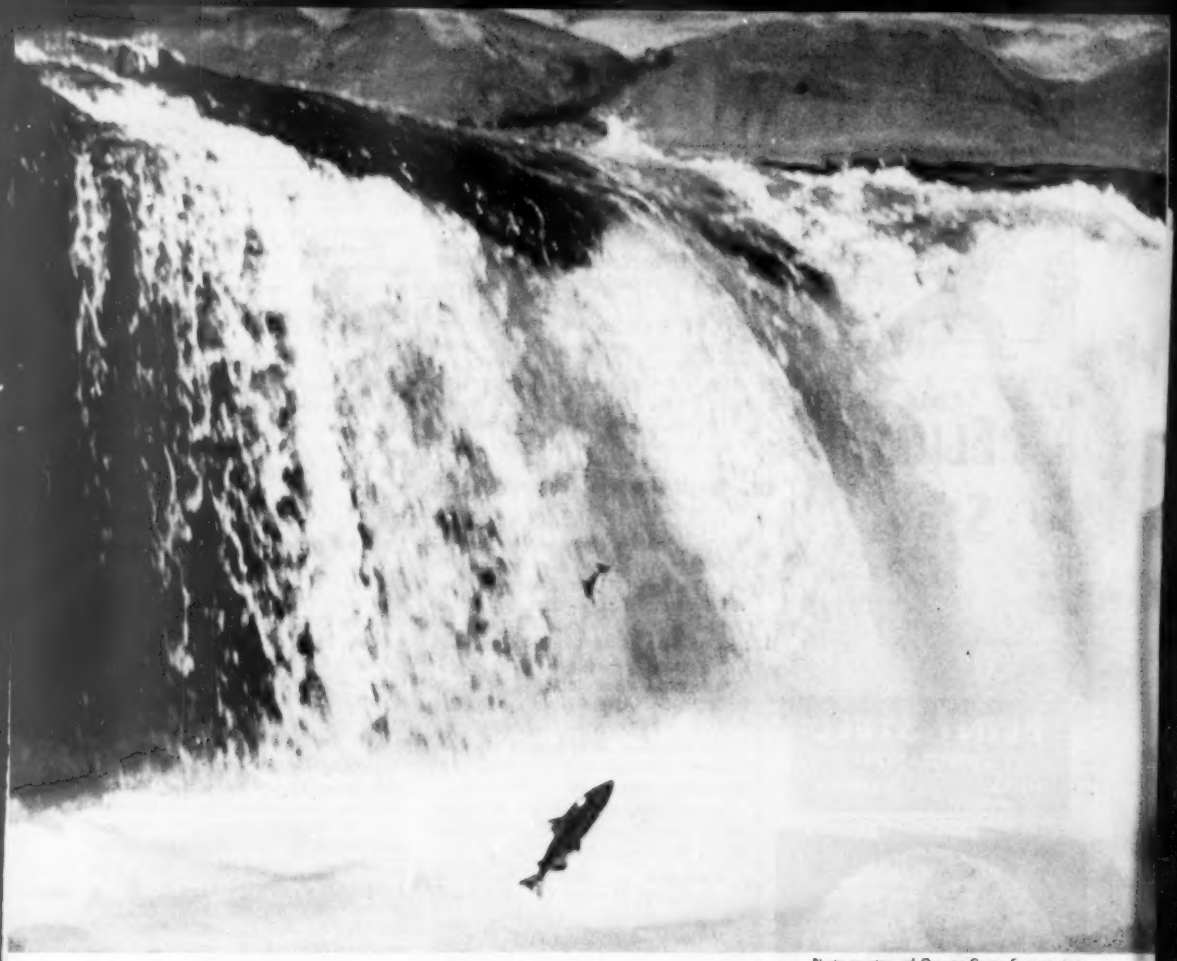

Photo courtesy of Oregon Game Commission

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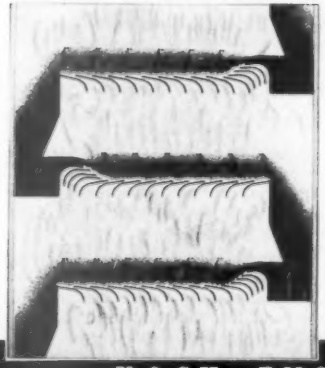

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REFINING

Program Shapes Up

Nine technical sessions set for 1953 mid-year meeting

NEW YORK. — A full program of technical sessions is planned for the 1953 mid-year meeting of the Division of Refining, American Petroleum Institute.

The division's new vice president, John W. Newton, of Magnolia Petroleum Co., Beaumont, Tex., has announced that the meeting will be held here May 11-14.

The program committee, headed by W. M. Holaday, Socony-Vacuum Oil Co., Inc., New York, has set up technical sessions on nine major subjects. Subcommittees have been set up to handle offers of papers and other details on each of the individual sessions. Chairmen are as follows:

Analytical research: E. L. Baldeschweiler, Standard Oil Development Co., P. O. Box 51, Linden, N. J.

Deterioration of metals: N. J. Rees, Socony-Vacuum Oil Co., Inc., 26 Broadway, New York.

Electrical equipment: L. M. Goldsmith, Atlantic Refining Co., 260 South Broad St., Philadelphia.

Corrosion of refinery equipment; E. Q. Camp, Humble Oil & Refining Co., P. O. Box 3538, Houston.

Refinery waste disposal: R. N. Giles, Standard Oil Co. (Ind.), 910 South Michigan Ave., Chicago.

Motor fuels: J. Bennett Hill, Sun Oil Co., Marcus Hook, Pa.

Personnel training: A. E. Houseknecht, Esso Standard Oil Co., 15 West 51st St., New York.

Lubricating oils: J. C. Geniesse, Atlantic Refining Co., 3144 Passyunk Ave., Philadelphia.

Processes: F. W. Schumacher, Standard Oil Development Co., P. O. Box 121, Linden, N. J.

Anyone desiring to offer papers on any of the preceding subjects is asked to communicate with the respective committee chairman, or with W. T. Gunn, director of the A.P.I. Division of Refining, 50 West 50th St., New York.

Pure Oil Investigating Cause of Nederland Blast

NEDERLAND, Tex.—An investigation into the cause of an explosion November 29 at Pure Oil Co.'s 60,000-bbl. refinery here was proceeding late last week.

The blast was reported to have occurred in one of the catalytic cracking units. It and the subsequent fire resulted in the death of seven workers.

The cracking unit was reported destroyed and two other crackers damaged. Total amount of damage as yet is not known. Bill Nelson, maintenance superintendent of the plant, said it might be several days before the cause of the explosion and extent of damage is determined.

Husky Awards Contracts for Expansion of Cody Refinery

CODY, Wyo.—Husky Oil Co. has let major contracts for a $1,000,000 construction program at its 5,000-bbl. refinery here.

Glenn E. Nielson, president, said last week major units being added include a 1,000-bbl. catalytic reforming unit and an asphalt-vacuum unit. Completion is set for June next year.

Nielson said Husky has signed a catalyst licensing agreement with Atlantic Refining Co. preparatory to construction of the reforming unit. Contract for construction of the reformer has been let to Grebe & Doremus Co., Houston.

Koch Engineering Co. has been awarded contract for the vacuum unit, which will produce asphalt and four vacuum gas-oil fractions. Other facilities include a diesel and distillate catalytic upgrading unit, a 30,000-lb. steam generator, and necessary tankage.

Contract for the steam generator was let to Wickes Boiler Co. The remaining unit contracts have not been awarded.

Work on New Suntide Plant Pushed at Corpus Christi

CORPUS CHRISTI. — Suntide Refining Co. revealed last week that construction of its new 30,000-bbl. refinery here is running as much as 60 days ahead of schedule.

Floyd L. Martin, president of Suntide, said foundations for the 30,000-bbl. crude-topping unit, the vacuum unit, and the 15,000-bbl. cat cracker, the absorber, and miscellaneous service buildings have been completed. Design, drafting, and purchasing necessary to permit operation of the new plant early next fall are proceeding on schedule.

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All of the steel for sixteen 80,000-bbl. storage tanks is on the site, Martin said, and five already are completed and tested, with nine more in various stages of construction.

The company has purchased the pipe for a 7-mile, 8-in. crude line and a 7-mile, 14-in. products line to connect with Sunray Oil Corp.'s crude-oil storage and deep-water terminal at Corpus Christi. Rights-of-way also have been negotiated, and laying operations will begin this month.

Suntide, a Sunray affiliate, will receive up to 25,000 bbl. of crude daily for the plant from Sunray's production in Nueces County and other Gulf Coast areas.

Shell's New Crude Unit at Martinez Plant on Stream

LOS ANGELES.—Shell Oil Co. has completed and placed in operation a new crude-distillation unit which will increase capacity of the company's Martinez, Calif., refinery by 10,000 bbl. daily.

John A. Tench, refinery manager, said the $250,000-plus expansion has hiked refinery capacity to about 70,000 bbl. daily.

Tench said a new $150,000 acid-treating unit also had been installed, together with auxiliary equipment such as pumps and heat exchangers.

The new distillation unit, manufactured by C. F. Braun Co., is the initial project in Shell's program to increase its capacity all along the West Coast and is part of nation-wide expansion program for which the company will spend about $100,000,000.

Refining Briefs

K. S. Adams, chairman of Phillips Petroleum Co., said recently that Phillips plans another expansion of cat cracking capacity of its Woods Cross, Utah, refinery within 2 years. Attending the dedication of the company's new $10,000,000 Thermofor cat cracker at the Woods Cross plant, Adams said Phillips expects to expand capacity of the cracker from the present 12,000 bbl. daily to about 18,000 bbl. daily, probably in 1954. The recent expansion *(The Oil and Gas Journal, November 17, page 445)* increased crude capacity of the refinery from the existing 5,000 to 12,000 bbl. daily. Previously the plant had no catalytic cracking facilities.

Standard Oil Co. (Ohio) has let contract for construction of a 11,300-bbl. per day Platforming unit at the company's 39,000-bbl. per day Lima refinery. The $10,000,000 unit will replace an existing thermal reformer.

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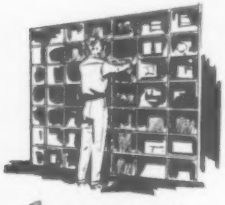

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Drilling Contractors

Wire Appointed to Head Drilling Research Group

F. W. Brigance, president of Rowan Drilling Co., Fort Worth, and president of the American Association of Oilwell Drilling Contractors, has announced the appointment of R. W. Wire, president of Loffland Brothers Co., Tulsa, as chairman of the association's Research and Education Committee.

Wire succeeds Jack Abernathy, vice president of Big Chief Drilling Co., Oklahoma City. Abernathy has served as chairman of the committee for two terms. Complete membership of the committee for the ensuing year has not been announced.

Fitzpatrick Drilling, Inc., Casper, Wyo., has a new contract job under way at Fish Lake, 34 miles northeast of Richfield, in Sevier County, Utah. The test, 1 Pierce, is being drilled for Condor Petroleum Co. Location is in the C SW SW 12-22s-4e.

Wakefield Drilling Co., Wichita, Kans., is contractor on a wildcat test which National Bulk Carriers, Inc., is drilling in Towner County, North Dakota. The test, 1 Hild, SE SW 31-158n-66w, is projected to the granite.

Harris & Suppes have a string of tools running for W. C. McBride, Inc., at 1 State, a wildcat test in the NW SW NW 36-16n-3e, 7 miles north of Chandler, Lincoln County, Oklahoma.

Justiss-Mears Drilling Co., Jena, La., is drilling a wildcat test in the south part of Catahoula Lake, 5 miles northeast of Holoway, northeastern Rapides Parish, Central Louisiana. Contract is for 4,400 ft. Kenilworth Oil Co. is the operator.

Stag Drilling Co., Chase, Kans., is drilling for Dozier Oil Co. at a wildcat location a half mile north of Lyons, Rice County, Kansas. Location of the test, 1 Stewart, in the SE SE NW 27-19s-8w, is 6 miles east of the Chase-Silica field, nearest production.

Crow Drilling Co., Inc., Shreveport, has two contracted wildcat operations under way in northwestern Grant Parish, Central Louisiana. One is located in C SE SE 17-8n-5w, just north of the Red River. The other is 2 miles to the east in 15-8n-5w, ½ mile east of Montgomery. Contracts are for 4,500 ft.

Musgrove Petroleum Corp., Wichita, Kans., has a rig contracted to Victor Drilling Co. for a wildcat test in the southeast corner of Graham County, Kansas. Location, 1 Grecian, in the NW NW NE 17-10s-2w, is 1¼ miles northeast of the Crocker pool and about the same distance southwest of the Cooper pool.

J. R. Sharp Drilling Co., Midland, Tex., and Tulsa, has a rig working for Toklan Royalty Corp. at 1 McBurnett, a wildcat test in 11-L-GH&SA Survey, Schleicher County, West Texas.

J. D. Sprecher Drilling Co., Casper, Wyo., has moved in a rig to resume operations at Shell Oil Co.'s Dutch Creek wildcat in McCone County, Montana. Drilling started early last summer, was suspended in July and rig moved off when the shortage of

On a rig being operated by Helmerich & Payne, Inc., Tulsa, for Shell Oil Co. in the Elk City field, Beckham County, Oklahoma. Left to right: Jack Shelton, evening-tour driller; R. E. Hawkins, crew member; Guy Robinett, day-tour driller; Edwin Pickerl and J. F. Gabbard, crew members.

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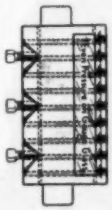

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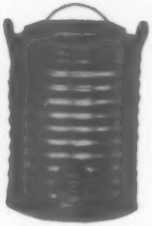

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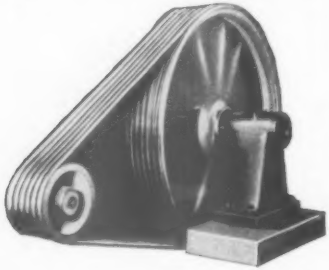

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tubular goods became acute. The area is 10 miles southwest of Shell's Richey field.

Stickle Drilling Co., Tulsa, has a rig working for The Texas Co. on a wildcat location 1½ miles west of the Southwest Hunter field in northern Garfield County, Oklahoma. Location is at 1 Buss, in the NW NW NW 26-24n-5w.

K & E Drilling, Inc., Wichita, has a rig under contract to Imperial Drilling Co., also of Wichita, for a wildcat test located 3 miles northwest of Jetmore, in Hodgeman County, western Kansas. Location, on the Springer lease, in the SW SW SW 23-22s-24w, is a mile west of the Jetmore field.

Glenn Drilling Co., Tulsa, has a contract with Sunray Oil Corp. for a 7,500-ft. wildcat test to be drilled in DeSoto Parish, northern Louisiana. Location of the test, 1 Olin Industries, is in the C SE NW 8-10n-14w.

Warren Drilling Co., Tulsa, has contracted to drill a 5,700-ft. wildcat test for Helmerich & Payne, Inc., also of Tulsa, in Grant County, northern Oklahoma. Location is a mile southwest of Lamont, in the NW SW SE 36-26n-4w. It is carried as 1 Balzer.

Delaney Drilling Co., Tulsa, has moved a rig to a wildcat location a mile southeast of Hawley, in Grant County, northern Oklahoma, where it will drill a 6,100-ft. Wilcox test for the account of W. A. Delaney, Jr., of Ada, Okla. The test is 1 Schonweis, in the SW SW SW 7-26n-7w.

Westlund Drilling Co. is drilling for W. M. and A. P. Fuller at 1 Linvill, a Cretaceous wildcat test located 2 miles north of Atwood, in the SE SE SW 6-7n-53w, Logan County, northeastern Colorado.

ACTIVE ROTARY RIGS*
(United States and Western Canada)

	Week ended	Change week ended	
Area—	12-1-52	11-24-52	12-3-51
Gulf Coast	640	+ 10	— 36
N. & W. Tex.-N. M.	821	— 44	—254
Ark.-N. La.-E. Tex.	146	— 8	— 44
Oklahoma	326	— 14	— 24
Kansas-Nebraska	153	— 37	— 43
Illinois-Eastern	140	— 2	— 9
Rocky Mountains	228	— 9	+ 28
Pacific Coast	170	+ 2	— 10
Total U. S.	2,624	—102	—392
Western Canada	175	— 1	+ 27
Total	2,799	—103	—365

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Pacific Coast and Illinois-Eastern areas are shown on pages 172 and 173.

I sure lost my head about that elevator

...and no wonder, because it *has everything!* ★ It has a slanting hinge pin for self-closing — it opens and *moves away* from the pipe when you unlatch it — and it *stays open* in proper position for easy handling. ★ Guards on the man-size handles protect hands from contacting the links — and it *stays* safely locked until *you* open it. ★ What elevator is this? Why, the Web Wilson "Balanced" Center Latch Elevator. ★ And who is the headless man? It's Johnny Deaver at New Iberia, Louisiana 155 (P.O. Box 79) and he can *still* talk to *you*.

Standco NO-SMOKE

STANDCO BRAKE LINING

Nothing novel — no bunk, but it gets the job done without scoring brake rims. See pages 3608-3613, Composite Catalog.

Standco Brake Lining Co.
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Manufacturers of
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ALL SIZES, TYPES AND PRESSURES
In accordance with
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NATURAL GAS

Sales Continue Up

September total is 10 per cent over sales last year

WASHINGTON.—Reports filed by 87 natural-gas companies with the Federal Power Commission for operations in September show that gas sales to ultimate consumers during the month climbed more than 10 per cent over September 1951 to 174 billion cubic feet.

Sales to residential, commercial, and industrial consumers were 19.3 billion, 5.9 billion, and 140.7 billion cubic feet—up 1.9, 5.2, and 12.6 per cent, respectively, from totals for September 1951.

Revenues from sales to ultimate consumers gained more than 13 per cent to $49,286,625 for the month. Net income was $7,885,572, up 46 per cent.

For the 12 months ended September 30, 1952, net income of $196,292,670 represented an increase of almost 4 per cent over the same period a year earlier.

Operating revenues of the 87 companies totaled $125,518,374 for the month, up almost 21 per cent, and $1,786,504,746 for the year, up 16.5 per cent.

Gas-utility operating income came to $14,397,576 for September and $265,407,746 for the year, for gains of 43 per cent and 8.5 per cent, respectively.

Net gas-utility plant aggregated $4,578,536,519 on September 30. This was 15 per cent above the amount recorded a year earlier.

Gas operating revenue deductions during the month amounted to $111,278,220, an increase of 18.5 per cent.

Hearings to Resume on New Gas-Well Allowable Policy

AUSTIN. — The Texas Railroad Commission will resume hearings here December 9 on its proposal to abolish the 19-year-old Texas policy of limiting gas-well allowables to 25 per cent of potentials and instead to base the allowable on the reasonable market demand which could be produced without waste.

Some of the operators' earlier misgivings about the plan appeared to have been resolved in a meeting in Dallas of about 75 executives of 36 companies late last month.

The meeting was held on the suggestion of the commission that the companies discuss the proposal among themselves and submit their recommendations.

Some of the operators before the meeting reportedly felt that any proposal to break down field-wide allowables into 160-acre proration units might penalize small-tract wells.

This was relieved recently when the commission recently suggested that a 6-month "balancing period" be established to effect the change, thus permitting hearings to establish field rules which would take precedence over state-wide regulations.

Argument Set This Week on Appeal of "Phillips" Decision

WASHINGTON. — The Circuit Court of Appeals here will hear argument December 12 on an appeal from a decision by the Federal Power Commission which 1½ years ago disclaimed jurisdiction over production and gathering activities of Phillips Petroleum Co. *(The Oil and Gas Journal, July 26, 1951, page 177).*

The appeal was brought by the city of Milwaukee and other communities which have been trying to force Phillips to roll back the price it charges for gas sold to pipe lines which serve the cities.

In the hearings during the early summer of 1951, FPC ruled that it had no authority over the price question unless it could be determined that Phillips was a natural-gas company as defined by the Natural Gas Act. The commission later found by a 4-to-1 vote that Phillips was not a natural-gas company.

FPC to Reopen Hearings on Alberta Imports February 16

WASHINGTON.—Hearings before the Federal Power Commission on applications by several companies to import natural gas from Alberta, Canada, will begin again February 16.

In a decision last week, the commission went against a recommendation by its counsels that all the applications be rejected for lack of evidence and ordered the hearings to continue. They had been recessed since last July.

Five of the companies seek to serve the Pacific Northwest area. These are Westcoast Transmission Co., Inc., Pacific Northwest Pipeline Corp., Northwest Natural Gas Co., Glacier Gas Co., and Trans-Northwest Gas, Inc. Still another firm, Northern Natural Gas Co., is planning to import Alberta gas to serve the Midwest.

At this same time, FPC approved a proposed amendment of the application filed by Pacific Northwest Pipeline to permit the company to apply to serve the Washington-Oregon area with gas from the San Juan basin in the United States instead of from Alberta as originally planned.

Gas Lines Watching FPC for Hint of Future Rate Policy

HOUSTON.—The natural-gas pipeline industry is holding back on any further expansion until it sees what effects, if any, the change in administrations will have on policies of the Federal Power Commission.

This view was expressed recently by Curtis Morris, president of Transcontinental Gas Pipe Line Corp.

The industry, he said, is hoping the new administration will do two things: (1)) Force FPC to abandon its "cost-of-money" theory of rate fixing, and (2) appoint men with more moderate views as commissioners.

A recent FPC decision granting a rate increase to Texas Eastern Transmission Corp. indicates the commission may have dropped the cost-of-money rate-fixing policy, Morris said, but this cannot be determined definitely at present.

Natural Gasoline

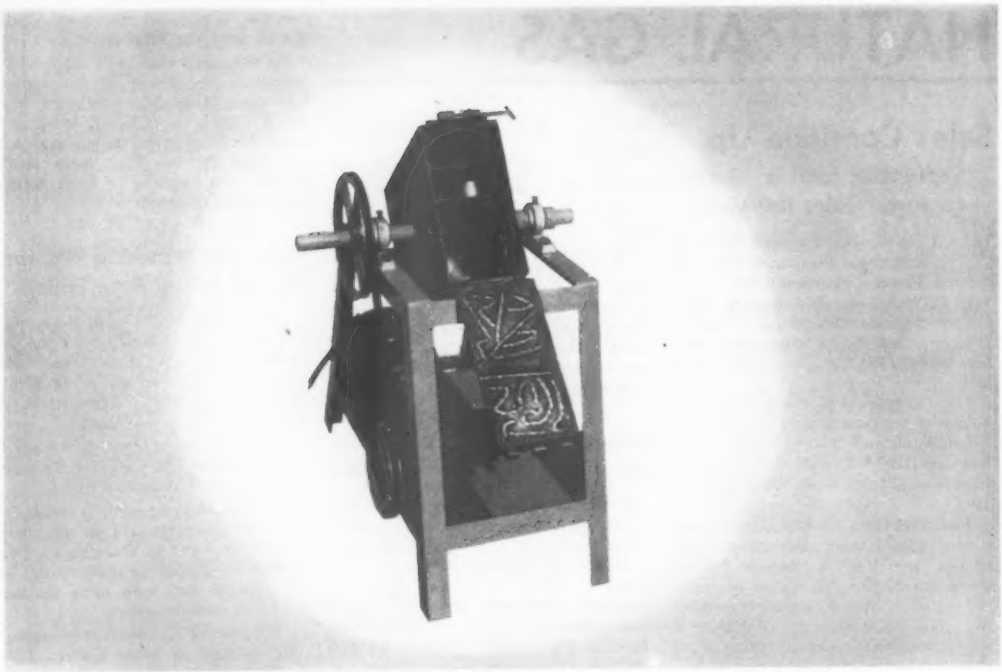
Tennessee Acquires Del Rey Share of Eagle Lake Plant

HOUSTON.—Tennessee Gas Transmission Co. and Tennessee Production Co., exploration and production affilliate, have acquired all assets of Del Rey Petroleum Co.

Tennessee, through the transaction, acquired a larger interest in a natural-gasoline plant in Eagle Lake gas field in the Chesterville area of Colorado County, Texas. Del Rey has been operator and part owner of the plant, along with Tennessee Production, Warren Petroleum Corp., and Sinclair Oil & Gas Corp.

Production capacity of the plant recently was expanded from the old total of 56,000 gal. daily to 72,000 gal. daily *(The Oil and Gas Journal, November 10, page 193).* Equipment is on order to boost capacity further to 90,000 gal. of natural gasoline and L.P.G.

Terms of the transaction were not disclosed. R. R. Dean, one of the principal owners of Del Rey, will join Tennessee Production as a vice president.



IT SHAKES, RATTLES and ROLLS

An ingenious destructive testing device that proves the stamina of General Geophones

Since the failure of a single "jug" in the field can seriously affect the record and cause costly delays in reshooting the spread, we take every precaution known to insure the dependability of General Geophones.

Over the past six years particularly, (as part of General's planned program of equipment improvement) we have conducted extensive research in geophone design. General Geophones in the field today are the most sensitive and sturdiest we have ever built. Sensitivity is carefully checked regularly in exhaustive laboratory tests. Stamina is checked equally carefully in specially constructed testing devices such as the one shown above.

We call it "The Thing" and it gives a geophone more punishment and wear in an hour than it will receive in the field in years. If a General Geophone design is ever going to fail, it will fail during this test and not in the field.

"The Thing" is a steel box which is "roughed up" inside with welding beads. Geophones are loaded into the device, and the top of the steel box locked. An electric motor rotates the box and the geophones shake, rattle and roll around inside. When tested in this manner, our latest designs have withstood 20 hours of tumbling without damage. In other tests, General Geophones are alternately submerged in boiling water and ice water.

Geophone design and testing are only two of the countless unseen "little things" that make a big difference in General's overall performance in the field. When your contract is with General, you get the benefits of General's planned program of equipment improvement . . . plus the skills of capable crews who are qualified by training and experience to help you explore new areas.

This is another result of General's planned program of equipment improvement.

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GEOPHYSICAL COMPANY

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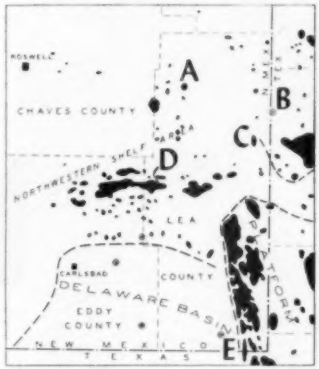
Permian Basin Eyes On New Mexico

IF any area in the Permian basin could be singled out as attracting the most exploratory interest at the present time it would be Southeast New Mexico—more specifically, northern Lea County and the northern portion of the Delaware basin.

Northern Lea County . . . Lower Permian, Pennsylvanian, and Devonian oil is being found and developed in this area. Flowing Mississippian production has been indicated at Amerada Petroleum Corp. 1 Weems (B on map), a Devonian discovery one location into Texas. Except for a small pumping pool in Borden County, Texas, there is no Mississippian production in the Permian basin. Amerada is now digging a confirmation test ½ mile southwest of the 1 Weems.

The most promising fields in northern Lea County have been found in the Devonian; however, not all Devonian fields show promise. Though the Devonian of this area is a porous dolomite (not principally chert as in parts of the Central Basin platform), structures are steep and oil accumulations erratic. Devonian structures have been found reflected in Pennsylvanian and even Permian rocks but, as a result of a pre-Pennsylvanian period of mountain making, they are also found without any reflection in younger rocks. Multipay fields have been developed where Devonian structures are reflected upward in the section, but Permian or Pennsylvanian oil does not necessarily mean Devonian oil.

Some geologists working northern Lea County think of the distortion of the Devonian rocks as resembling that found in the exposed Paleozoics of the Appalachians. Extremely steep dips have been encountered in the Devonian and structures apparently are on parallel "ridges" with a north-south alignment. One ridge has been indicated north-south through Bagley field (A on map) and another north-south through the big Denton field (C on map). The probability that additional parallel ridges exist is well recognized. Every



Devonian-bound well in this area is still a wildcat and if the 10,000-12,000-ft.-deep Devonian through this area is found to be twisted like the rocks of the complicated Appalachians, comparatively easy development drilling may be a long way off.

The 13,500-ft. Buffalo Oil Co. 12-B Baish (D on map) in Maljamar-Permian field is not a big producer but it has indicated the existence of Devonian oil considerably south of the more actively prospected area of northern Lea County. A confirmation test believed to be better located on structure is scheduled.

Delaware basin . . . The little production that has been developed in the Delaware basin has been principally from sands in the top of the Permian-Delaware Mountain group and the few deep wildcats that have been drilled in this basin have not found any other potentially productive formations in the thick Permian section.

These facts have led some geologists to say that Delaware basin development will be retarded because an operator cannot afford to drill 10,000 ft. of wildcat hole and not be able to look at more than one potential pay. This idea is a bit premature because there has been too little drilling within this basin to say there are no other possibilities. One indication that there may be other oil-bearing Permian rocks has been found at Sun Oil Co. 1 Harper-Federal (E on map) which is swabbing sizable shows of oil in the Bone Springs formation below the Delaware Mountain group.

Closely watched as potential indicators of the future of the Delaware basin are three Devonian-bound wildcats of Richardson & Bass (unlettered dots on map). Location for these wildcats followed a coordinated exploratory program, but even the best work in the Delaware basin is inadequate. It is going to take just such daring wells to open the area.

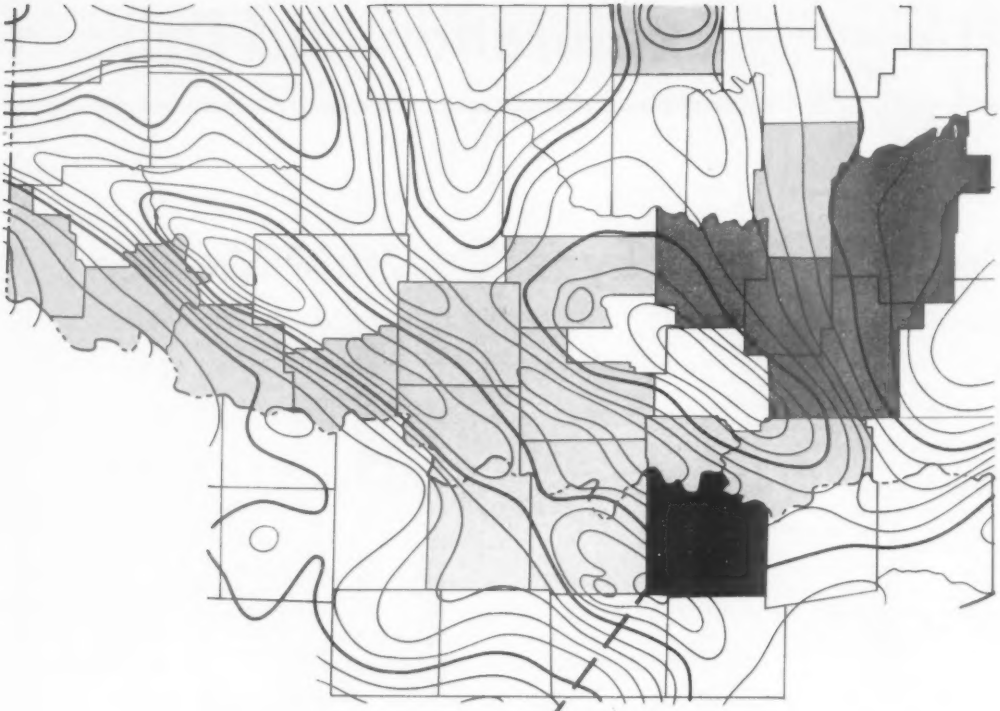
Philip C. Ingalls

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

NORTH DAKOTA . . . Zack Brooks and Crawford Smith have recovered additional oil and gas-cut mud and pulled cores with good show of oil at 1 Berentson, C SW SE 21-163n-83w, Bottineau County wildcat.

MONTANA . . . Continental Oil Co. is waiting for casing at 1 Fast, West Poplar area discovery in Roosevelt County. Operators tested oil from the Madison at the rate of 20 bbl. per hour. Deep Rock Oil Corp. has perforated the zone 8,745-98 ft. and is running tubing to acidize and test at 1 Picard, eastern Roosevelt County wildcat.

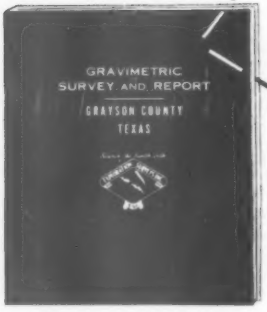
WEST TEXAS . . . Phillips Petroleum Co. 1-CC University, Andrews County Devonian discovery, was completed flowing 2,310 bbl. of oil per day. In south Andrews County, Magnolia Petroleum Co. 1-EA Fasken will complete as a Wichita-Albany discovery.



Red River Region Report

GRAYSON COUNTY, TEXAS

One of the most active areas at the moment is the promising Red River region. We have available for immediate release one of our E.S.I. Gravimetric Survey and Report volumes on Grayson County, Texas, with expertly compiled geological and elevation interpretations, numerous maps (isogal, derivative, elevation, ownership, etc.), including a comprehensive analysis of these data. The survey covers the entire county and is thoroughly reliable and authoritative in every respect. It constitutes a complete report—comparable in every detail to a full-fledged contract survey, at only a fraction of the cost. If you would like information on prices, etc., of this and other E.S.I. County Reports on the Red River area, write on your firm's letterhead to 5615 Daniels Ave., Dallas, Texas. There is no obligation, of course.



Exploration Surveys Inc.

County Gravimetric Reports

Permian Basin

Wolfcamp Discovery Finaled in Upton

MIDLAND.—Wilshire Oil Co., Inc., completed 1-12 Timmins as a flowing Wolfcamp discovery southwest of Pegasus-Ellenburger field of Upton County. Operators have asked the Texas Railroad Commission that it be designated the Pegasus-Wolfcamp field. Potential was 314 bbl. of oil a day through ¾-in. choke from perforations at 9,900-10,134 ft. Nearest Wolfcamp production is in the Wilshire field some 11 miles south.

In Schleicher County, Sinclair Oil & Gas Co. 1 Dwight McClatchey, 31-M-GH&SA, flowed 82 bbl. of oil in 5 hours to extend Pennsylvanian production 1 mile south of Hulldale field. Gage was through 18/64-in. choke from perforations at 5,630-40 ft. Operators were preparing to acidize.

In Andrews County, Magnolia Petroleum Co. 1 University, Lease 36,991, reported oil shows in the Ellenburger in coring from 13,937-50 ft., then recovered water cushion and 30 ft. of oil and gas-cut mud on drill-stem test from 13,910-50 ft., and was drilling ahead at 13,958 ft. Location is ½-mile north of the firm's Magutex discovery which had flowing oil in the Devonian and completed in the Ellenburger. The north outpost has dampened hopes for the new area somewhat, with no shows in any zone above the Ellenburger. Top of the Ellenburger at 13,874 ft. was reported only 51 ft. above the water table.

South of the Magutex discovery, Magnolia 1 University, lease 36,995, was drilling at 13,467 ft. at last report. Last marker in it was the Devonian at 12,493 ft.

In southeast Andrews County Magnolia 1 Fasken BA, prepared to drill-stem test at 12,002 ft. The firm's 1 Fasken CA was drilling limestone at 12,513 ft.

Magnolia 1 Fasken EA 15,000-ft. test in southern Andrews County, 5 miles north of Anderson-Prichard Oil Corp. 1-24 Fasken, Ellenburger discovery, perforated an unidentified section from 8,430-50 and 8,460-90 ft. and flowed 107 bbl. of 35°-gravity oil in 12 hours through 24/64-in. choke. Total depth was 9,143 ft.

Honolulu Oil Corp. and Signal Oil & Gas Co. 1 Mathews, Hockley County wildcat 2 miles northwest of Ropes, recovered water blanket and 2,550 ft. of clean oil with no formation water on a drill-stem test in Pennsylvanian reef limestone from 9,250-95 ft. Time on the test was 8 hours. Top of the reef was 9,250 ft. on 3,401 ft. elevation. Operators were pulling core from 9,304-15 ft.

Phillips Petroleum Co. 1-CC University, discovery or extension well northwest of Magutex feid, Andrews County, was completed from the Devonian. Calculated potential of 2,310 bbl. of 43°-gravity oil was based on a 12-hour flow of 1,155 bbl. through ¼-in. choke from perforations at 12,490-556 ft. Tests in the Ellenburger developed flowing oil up to 40 bbl. hourly, which decreased rapidly when salt water came in.

Pan American Production Co. and Seaboard Oil Co. 1 Pauline Hamlin, Howard County wildcat southwest of Vealmoor-Canyon field, completed as a Canyon reef discovery. Potential was 312 bbl. of 49°-gravity oil through 20/64-in. choke from perforations at 8,160-68 ft. Top of the reef was 8,134 ft. on 2,775 ft. elevation. Pan American Production filed application to drill 1 O. H. Petty as a northeast offset to the discovery. Location for the new test is in 4-32-T3N-T&P.

In the Texas Panhandle, Shamrock Oil & Gas Corp. 1 Maddox, Section 159, east outpost to Quinduno field of Roberts County, developed salt water with no shows on a drill-stem test in granite wash from 7,$15-50 ft., and was drilling ahead.

Morgan & Head 1 Morrison Ranch, 12-C-G&M, was drilling at 8,178 ft. in shale. The Texas Co. 1 Fannie Ledrick, north of Quinduno field, was drilling lime at 4,430 ft. Gulf Oil Corp. 1-A Clark, 19-M2-BS&F, had total depth at 4,066 ft. and prepared to test. Gulf 1 Haggard, 5-2-H&GN, plugged back to 6,743 ft. from 9,400 ft. and prepared to test. All operations above are in Roberts County.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Lynn County, O'Donnel field: Round Top Oil Co. 1 Garza Land & Cattle Co., 431-9-EL&RR, TD 9,367 ft., elev. 2,915 ft., pay 9,297 ft., IP 396 bbl. 42°-gravity oil, ¼-in. choke, TP 300 psi., GOR 144 cu. ft., last marker reported, Mississippian at 8,935 ft.

Runnels County: G. W. Strake 1 Charity Pace, L. Forsythe Sur. 450, 1½ miles SE Wingate, TD 4,188 ft., elev. 2,016 ft., pay 4,453 ft., IP 296 bbl. 42°-gravity oil, 32/64-in. choke, GOR 687 cu. ft., TP 60 psi.

Yoakum County: Amerada Petroleum Corp. 1 L. R. Weems, 403-D-J. A. Gibson Sur., 4 miles S Bronco, TD 11,860 ft., elev. 3,813 ft., top Devonian pay 11,692 ft., perforated 11,773-850, 11,850-60 ft., IP 1,935 bbl. 43°-gravity oil, ¾-in. choke, TP 200 psi., GOR 178 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Andrews County: Cities Service Oil Co. 1-D University, 16-14-University, dry, TD 4,606 ft.

Crane County: Forest Oil Corp. 1-B University, 11-30-University, dry, TD 12,510 ft., elev. 2,681 ft., Devonian 10,070 ft., Silurian 11,060 ft., Simpson 11,930 ft., Ellenburger 12,240 ft.

Howard County: Burdell Oil Co. 1-A Hodnett, 31-25-H&TC, dry, TD 3,070 ft.

Standard Oil Co. of Texas 2 C. L. Jones "1," 59-20-LaVaca Navigation Sur., dry, TD 2,932 ft.

Kimble County: Anzac Oil Corp. 3 Lawler, 12-15-TWNG, dry, TD 2,056 ft., Ellenburger 1,954 ft.

Loving County: McDaniel & Beecherl 1-A State, 29-29-PSL, dry, TD 4,869 ft., elev. 2,882 ft., Delaware lime 4,812 ft., sand 4,853 ft.

Mitchell County: Standard Oil Co. 1 C. L. Jones "2," 60-20-LaVaca Navigation Sur., dry, TD 2,927 ft.

Runnels County: Giles & Doss 1 R. H. Herring, Sec. 32, H&GN, dry, TD 4,850 ft.

Sutton County: Hewgley Drilling Co. 1-A Arthur Stuart, 60-7-TW&NG, dry, TD 5,626 ft., elev. 2,202 ft., Strawn 4,335 ft., Ellenburger 5,522 ft.

Tom Green County: Austral Oil Exploration Co. 1 Harris Est. 68-6-H&TC, dry, TD 6,010 ft., elev. 2,497 ft., Wolfcamp 4,600 ft.

Val-Carroll Oil Co. 1 D. D. Wall, 23-5-H&TC, dry, TD 962 ft.

Upton County: Bond Oil Corp. et al 1 Goode Est., 23-B-HE&WT, dry, TD 4,203 ft.

SOUTHEAST NEW MEXICO

Sun Oil Co. was still swabbing at 1 Harper-Federal, Lea County wildcat in 26-25s-35e. Swabbing with fluid level around 8,000 ft., recovery was 38 bbl. of oil and no water in 5 hours. When shut in overnight, tubing pressure reached 200 psi. but it would not flow when opened, and swabbing was resumed.

Gulf Oil Corp. 1-AT State, east outpost to North Tulk field, swabbed 57 bbl. of oil and 66 bbl. of sulfur water on a 24-hour test of the Permo-Pennsylvanian from 9,750-9,850 ft.

Northwest of Monument field, Shell Oil Co. 1-RA State, 31-18s-36e, was shut down for orders after testing drilling mud and salt water at 6,282-6,439 ft.

In Eddy County, Richardson & Bass 1 Fidel-Federal, 27-21s-29e, east of Carlsbad, recovered 125 ft. of slightly oil and gas-cut mud on drill-stem test to 4,973 ft. Operators were coring ahead.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Lea County: Lawton Oil Corp. 2 State, 10-13s-33e, TD 13,080 ft., elev. 4,261 ft., Pennsylvanian pay 11,340 ft., IP 112 bbl. 53°-gravity oil, 1,320,000 cu. ft. gas, 1-in. choke, TP 1,600 psi., GOR 11,700 cu. ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Chaves County: Lubbock Machine & Supply Co. 1 Randle & Anderson, 3-16s-16e, dry, TD 1,848 ft., elev. 5,798 ft., Abo 1,641 ft., pre-Cambrian 1,770 ft.

Lea County: Wilson Oil Co. 1 Amerada-State B, 27-16s-32e, dry, TD 4,915 ft., elev. 4,296 ft., San Andres 4,200 ft.

Canadian Fields

Light Gravity Crude Oil Found in Bawlf Area

CALGARY.—Light gravity crude oil has been discovered in the D1 zone of Devonian at a wildcat in the Bawlf area of central Alberta, 50 miles southeast of Edmonton. Only one well in Alberta has so far yielded oil in commercial volume from the D1 Devonian zone, and that is a venture in the Lake St. Ann area of the province. The new Bawlf strike may shape into the province's second commercial producer from that formation.

The discovery came at Phillips Petroleum Co. 1 Neilson, in LSD 10, 30-46-17w4, 15 miles east of Camrose. The D1 zone was contacted at 3,645 ft., or 1,083 ft. subsea (k. b. elevation 2,382 ft.), and first reported test was run from 3,500-32 ft. for 50 minutes. Natural gas flowed to surface in 3 minutes, at maximum rate 555,000 cu. ft. daily, and recovery consisted of 134 ft. of clean oil and 15 ft. of oil-cut mud. Gravity of the oil was measured at 34.6°.

Second test, from 3,527-42 ft. did not flow gas, but only gave up a 1-hour pipe recovery of 50 ft. drilling mud. Forty-five minute drill-stem test from 3,541-56 ft., flowed gas in 2 minutes, at rate 240,000 cu. ft. daily, and yielded recovery of 900 ft. clean oil. Interval 3,554-66 ft. flowed gas in 3 minutes, at rate 98,000 cu. ft. per day and 1-hour pipe recovery consisted of 2,820 ft. of clean oil and 180 ft. of salt water. Coring is being continued below 3,566 ft.

Six Canadian independent oil companies and an individual have discovered a large flow of natural gas and some light crude oil at their wildcat in the Erskine area of Alberta, 95 miles northeast of Calgary.

The oil discovery well obtained its initial oil during drill-stem test in the Cretaceous formation earlier this week. That venture,

Merill 5-1 Mitmor & Associates in LSD 5, 1-39-21w4, is 4½ miles northwest of Stettler Devonian oil field, and some 95 miles northeast of Calgary. The Cretaceous discovery drill-stem test was run from 4,435-55 ft., and gave a natural gas flow to surface in 1 minute, at maximum rate 11,400,000 cu. ft. daily, and a fine spray of oil in 25 minutes. Pipe recovery was 40 ft. of clean oil, approximately 35°. Later test, from 4,454-61 ft. flowed gas in 15 minutes, at rate too small to measure, and yielded a pipe recovery consisting of 450 ft. of clean oil, slightly watercut at base, and 390 ft. of slightly salty water. Plan is to continue coring and testing, run log, set string of casing and start production tests.

A group headed by Chamberlain Oil & Gas has discovered natural gas in the Bow Island sand at a wildcat in the Bindloss area of eastern Alberta. Drill-stem tests in the gas sand gave up flow rates ranging from 3,500,000 to 4,000,000 cu. ft. daily.

The gas strike came at Chamberlain 1-33 Bindloss, in LSD 1, 33-22-4w4, 150 miles east of Calgary, 21 miles west of the Saskatchewan border and 60 miles north of Medicine Hat. Crew contacted the Bow Island sand at 2,377 ft. (kb. elevation 2,396 ft.), and ran first drill-stem test from 2,3774-34 for 47 minutes. There was a steady gas blow which reached a maximum rate of 4,000,000 cu. ft. daily, with no fluid recovery. Flowing pressure was 800 psi., while shut-in pressure was around 850 psi. Second test, from 2,384-94 ft., gave a steady gas blow, with maximum rate of 3,500,000 cu. ft. daily during 20-minute test. There was no fluid recovery on second test either. Third test from 2,391-401 ft., gave a fine blow after 10 minutes, and a 30-minute recovery of 365 ft. of slightly gassy muddy salt water. Well is now drilling below 3,075 ft. and will test all horizons to the Jefferson.

CANADIAN SUCCESSFUL WILDCATS

Western Trinidad 9-12 Fenner, on LSD 12, 9-33-9w4, TD 3,601 ft., capped potential gas well.

Phillips Holmberg, LSD 3, 32-44-17w4, TD 4,280 ft., capped potential gas well.

Canpet Fina 1 Manville, on LSD 11, 24-50-9w4, TD 3,047 ft., capped potential gas well.

CANADIAN WILDCAT FAILURES

Baysel 1-6 Chip Lake, on LSD 1, 6-55-9w5, TD 8,505 ft.

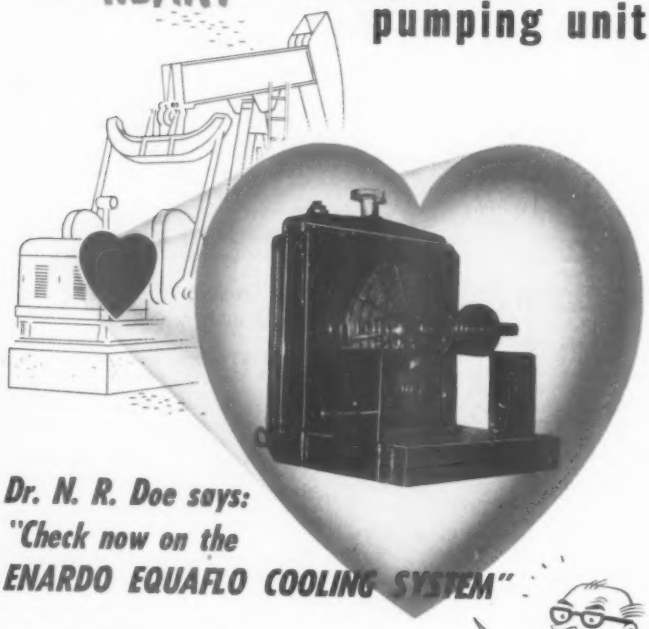
Seaboard et al 2 Cossack, on LSD 10, 28-60-17w4, TD 3,412 ft.

Cities Service 1 Lubicon River, on LSD 12, 19-84-9w5, TD 5,456 ft.

Union Westfall Ashley 2 Pipestone Creek, on LSD 1, 32-47-25w4, TD 6,598 ft.

EASTERN CANADA

Ontario. — Extensive government survey work in southwestern Ontario and particularly in the Haldimand and adjacent gas fields was urged by A. Earl Catherwood, M.P. for Haldimand, in the House of Commons. Pointing out that Haldimand has some 2,000 shallow gas wells and Norfolk at least 350, Catherwood urged Hon. George Prudham, minister of mines, to undertake a thorough survey to determine oil possibilities.



For greater cooling efficiency on all internal combustion engines and compressors, Dr. N. R. Doe prescribes the Enardo Equaflo Engine Jacket Water Cooler. These cooling systems, manufactured in various capacities, have proven especially economical in areas where water is scarce. With a mean temperature differential of only 10° between inlet and outlet Equaflo maintains the most efficient engine operating temperature. Equaflo, with its minimum evaporation losses, practically eliminates scale formation and maintains cooling efficiency indefinitely. AND . . . it is portable!

ENARDO Mfg. Co.
BOX 1647 TULSA, OKLAHOMA
"TAKING THE PULSE OF THE OIL INDUSTRY"

Eastern Texas

Potential Gage Reported At Cherokee Discovery

DALLAS.—Potential gage was reported on northeast Cherokee County's Woodbine sand discovery, and locations were announced for two explorations in the same area.

Stone & Ray 1 Kee, R. H. Tobin Survey, 7 miles northwest of Summerfield, logged 2 ft. of saturated sand in the Woodbine at 3,768-70 ft., then recovered 2,500 ft. of oil on drill-stem test of the section. On production test through 5/64-in. choke, it was reported to have flowed at the rate of 125 bbl. daily. Location is 2 miles west of the 1-well Stegall field and 3½ miles south of East Texas field wells.

New work for the area included Martha Baker 1 Bond & DeLoach, Perry Reese Survey, contracted to 3,800 ft. Elevation on the test is 361 ft. Jim McMurrey 1 J. R. Martin was located in the R. H. Tobin Survey. Scheduled depth was 4,000 ft. and elevation was 410 ft.

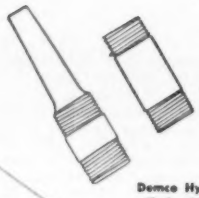
W. B. Hinton 1 Cora Helen Tipton, Cherokee County wildcat southwest of Summerfield, was drilling below 7,007 ft., on a 9,100-ft. contract.

Union Production Co. 1 Gibson, Robertson County wildcat 5 miles northeast of Calvert, developed 30 ft. of gas-cut mud on a drill-stem test from 6,157-72 ft. Operators were coring ahead, below 6,220 ft.

Sells Petroleum Co. 1 Flanagan Unit, Rusk County test 3 miles north of Tatum, was reported to have had gas shows in the Pettit limestone. Operators were setting casing on bottom at 6,806 ft. for production tests.

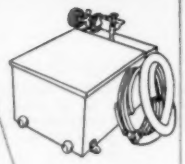
EAST TEXAS (DISTRICTS 5 AND 6) SUCCESSFUL WILDCAT

Kood County: L. A. Grelling Co. 1 Mary



Demco Hydraulic Choke Nipples

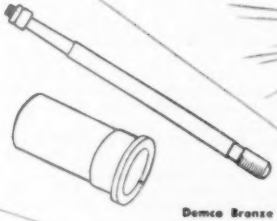
Demco Gland Bushings and Junk Rings



Demco Rod Oiler

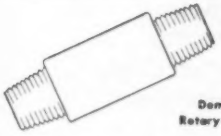
Demco Alloy Steel Pump Studs

Demco Hydraulic Hose Adapters

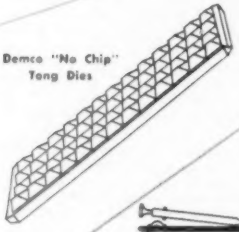


Demco Bronze Rods and Liners

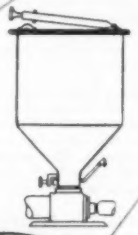
Demco Hose Hobbles



Demco Rotary Subs



Demco "No Chip" Tong Dies

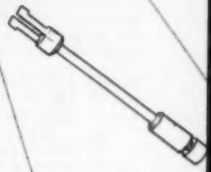


Demco Auto-Flo Mud Hopper

Demco Pump Brace and Spacers

Demco Standpipe Clamps

Demco Casing & Blowout Preventer Tester



Demco Float Seat Puller

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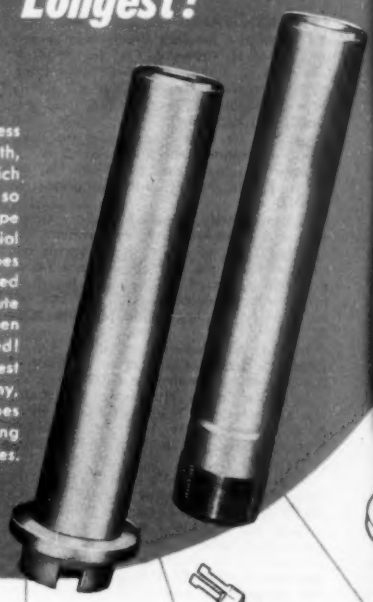
Demco's exclusive finishing process provides a mirror-smooth, abrasive-resistant surface which reduces friction — and so lengthens life of both wash pipe and packing. Made from special alloy steel, these wash pipes are uniformly heat treated inside and outside, to absolute maximum hardness — then precision machined! In a recent impartial test by a major oil company, Demco Wash Pipes lasted 5 TIMES as long as other makes.



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DRILLING EQUIPMENT MANUFACTURING CO.

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Saner, Mary Polk Sur., A-454, 1 mile NE Pine Mills field, TD 6,070 ft., elev. 454 ft., Woodbine 5,140 ft., pay 5,348-52 ft., IP 172 bbl. 19°-gravity oil.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Harrison County: LaGloria Corp. 1 H. C. Cadenhead, Wm. Williams Sur., A-757, dry, TD 6,810 ft.

Hopkins County: C. M. Ashby 1 D. D. Jumper, Daniel Fuller Sur., A-311, dry, TD 4,117 ft.

Leon County: B. F. Phillips Jr. 1-A Carter & Gragg, Carl Dorr Sur., dry, TD 6,560 ft.

Upshur County: Rexall Drilling Co. 1 G. W. Rash, C. F. Reneau Sur., dry, TD 3,750 ft.

North-Central Texas

New Caddo Pool Opened In Jack County Area

WICHITA FALLS.—A new Caddo limestone pool for Jack County was opened by Clifford H. Brown & Co., Inc. 2 W. J. Chambers, 2 miles east of Bryson. Completion potential was 314 bbl. of 42°-gravity oil a day through 12/64-in. choke, from perforations at 4,204-26 ft.

Location for a new venture in the same area was reported. J. B. Hewitt 2 W. J. Chambers, 1 mile east of Bryson in the Lewis Knight Survey, will be drilled to 5,500 ft.

In Clay County, Russell Maguire 1 Greer, wildcat 8 miles southwest of Henrietta, recovered 570 ft. of gas, 40 ft. of heavily oil-cut mud and 1 gal. of black oil on a 2-hour drill-stem test at 5,229-36 ft. A test from 5,269-76 ft. produced a light blow but had no recovery. Drilling continued below 5,276 ft.

Dillard & Waltermire Drilling Co. 1 George Segler, wildcat 6 miles northeast of Joy, was drilling in shale at 6,222 ft.

In Cooke County, Humble Oil & Refining Co. has scheduled 1 Virginia Castle, Block 6, A. Hilburn Survey, A-441, as a 7,000-ft. wildcat. Location is in the northwest corner of the county.

Knox County gained a 6,500-ft. wildcat by Hunt Oil Co. as 1 Bobby Burnett, in 68-C-H&TC Survey, 9 miles northeast of Benjamin.

Flaitz and Mitchell 1 Kay Kimbell, Grayson County wildcat northwest of Sherman, recovered 40 ft. of drilling mud on a 1-hour test from 6,956-71 ft., but operators said the tool plugged with mud in 15 minutes. Electric survey was being run to 6,971 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: D-D Drilling Co. 1 O. Calvin Blk. 1, Sulphur Forks Iron Works Sur., TD 1,090 ft., elev. 1,208 ft., pay 1,086 ft., IP pumped 32 bbl. 38°-gravity oil.

Hamilton Oil Co. 1-D Abercrombie, S. Swartout Sur., A-197, TD 5,252 ft., Mississippian pay 5,240 ft., IP 108.4 bbl. 43°-gravity oil in 6 hours, 16/64-in. choke, TP 375 psi., GOR 450 cu. ft.

Clay County: Ada Oil Co. 1 Ernest Watts, Blk. 17, Hopkins CSL, A-176, TD 4,663 ft., elev. 1,058 ft., pay 4,637 ft., IP 373 bbl. 40°-gravity oil, 12/64-in. choke, TP 125 psi., GOR 422 cu. ft.

Frank Wood Associates, Inc. 1 W. J. Neville, Blk. 64, Orange CSL, TD 6,271 ft., elev. 910 ft., pay 6,024-28 ft., IP pumped 30 bbl. 43°-gravity oil.

Jack County: Charlie Grace Production Co. 1 W. R. Johnson, G. W. Davis Sur., A-179, TD 5,050 ft., elev. 987 ft., conglomerate pay 5,041 ft., IP 157 bbl. 42°-gravity oil, 20/64-in. choke, TP 240 psi., GOR 1,775 cu. ft.

Taylor County: J. C. Axelson 1 F. O. Graham, Sec. 452, Wm. M. Smith Sur., TD 4,579 ft., elev. 2,026 ft., Gardner sand 4,420 ft., IP pumped 39 bbl. 42°-gravity oil, GOR 150 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: I. Dee Campbell 1 C. Benson, Blk. 10, Jefferson CSL, dry, TD 1,170 ft.

Campbell 1 Bruner, TE&L Sur., A-630, dry, TD 1,467 ft.

R. W. Darden & W. F. Bockhoff Trust 1 Calvin, E. Waiesichouski Sur., A-675, dry, TD 12,060 ft., Gunsight 1,122-27 ft.

Weldon S. Guest 1 Birdwell, TE&L Sur. 2,418, dry, 1,383 ft.

D. D. Strange 1 T. Minnick, Jose Ostane Sur., A-333, dry, TD 1,143 ft., Twin line 1,099 ft.

Callahan County: Sam C. Dunn 1 A. E. Dyer, Sec. 55, BBB&C Sur., dry, TD 3,978 ft.

John H. Wilson 1 Fae Wilbanks, J. H. Johnson Sur., dry, TD 2,188 ft.

Clay County: The Texas Co. 1 M. S. Deason, Lot 87, Angelina CSL, A-3, dry, TD 6,270 ft.

Coleman County: J. H. Blackwell 1-A Edwards, Sec. 700, J. H. Barkley Sur., dry, TD 2,005 ft.

Blackwell 1-D Edwards, Sec. 700, Blk. 16, Barkley Sur., dry, TD 2,205 ft.

Dal Tex 2 Floyd Price, Sec. 46, T&NO Sur., dry, TD 1,871 ft.

Duquesne Oil Corp. 1 J. P. Morris, Sec. 4, W. B. Rodden Sur., dry, TD 3,780 ft., elev. 1,911 ft., Capps 3,315 ft., Gardner 3,585 ft., Gray 3,725 ft.

B. W. Fitzgerald 1 Lewis Fisher, 7-2-GH&H, dry, TD 2,790 ft., elev. 1,655 ft., Morris 2,250 ft., Gardner 2,650 ft., Gray 2,740 ft.

Forest W. Gregory 1 Eddie Garrett, James S. Martin Sur., dry, TD 1,609 ft.

G. W. McCoy 1 James H. Dixon, 666-66-Wm. Doran Sur., dry, TD 1,938 ft., Gardner sand 1,936 ft., Gray 1,892 ft.

Horace White 1 M. W. Sealy, Sec. 318, Wm. Sheperd Sur., dry, TD 3,791 ft., elev. 2,010 ft., Capps 3,251 ft., Caddo 3,710 ft.

Comanche County: Gilcrease Oil Co. 1 O. R. Feril, Sec. 19, Vira Campbell Sur., dry, TD 4,278 ft., elev. 1,562 ft., Ellenburger 2,644-4,135 ft.

Cooke County: W. P. Luse 1 W. T. Lynch, J. W. Blankenship Sur., A-1,332, dry, TD 4,950 ft.

Eastland County: Bell Petroleum Co. 1 D. D. Feldman, 67-4-H&TC, dry, TD 3,604 ft.

Fisher County: Jones & Stasney 2 W. J. Bryan, 184-1-BBB&C, dry, TD 4,380 ft., elev. 1,772 ft., upper Swastika 3,658 ft., lower 3,714 ft.

Grayson County: Star Oil Co. 1 W. A. Moser, J. C. Parks Sur., A-967, dry, TD 5,425 ft.

Superior Oil Co. 1 S. L. Privette, A. Hernandez Sur., A-488, dry, TD 8,159 ft.

Haskell County: Kendrick-Lucas and Kendrick & Moore 1 R. J. Fox, S. T. Blakeley Sur., dry, TD 4,786 ft., Palo Pinto 3,170 ft., Caddo 4,626 ft.

J. J. Lynn 1 A. W. Weaver, J. Giboney Sur., dry, TD 5,536 ft., elev. 1,452 ft., Caddo 5,154 ft., Mississippian 5,436 ft.

Jack County: W. H. Hammon 1-C Rhodes, Sec. 1, BS&F Sur., A-83, dry, TD 4,594 ft.

Kingery & Patterson 1 I. L. Gillespie, TE&L Sur. 2,712, dry, TD 5,266 ft.

Continental Oil Co. 2 Alexander Est. 32-F-H&TC, dry, TD 6,212 ft., Caddo 5,772 ft., Mississippian 5,859 ft., Ellenburger 6,156 ft.

Jones County: T. M. Evans 1 Foy Marshall, Sec. 5, BBB&C Sur., dry, TD 3,625 ft., Gunsight 2,300 ft., Palo Pinto 3,637 ft., elev. 1,610 ft.

K&H Operating Co. 1 W. U. Shannon, 13-17-T&P, dry, TD 4,980 ft.

Roy D. Payne 1 R. N. Richardson, Sec. 7, GH&H Sur., dry, TD 4,156 ft.

Price Bros. & Gehle 1 W. B. Adamson, Sec. 7, GH&H Sur., dry, TD 4,026 ft.

Montague County: D. H. Bolin 1 J. E. Martin, Elijah Valtaw Sur., A-827, dry, TD 2,110 ft.

Stephens County: Roy H. Smith Drilling Co. 1 Z. W. Sutphen, 51-5-T&P, dry, TD 2,191 ft., Strawn sand 2,120 ft.

Allan R. Strong 2-A W. M. Ford, Blk. 1,062, TE&L Sur., A-409, dry, TD 2,510 ft.

Woodson Oil Co. 1-B Hill, Sec. 1,124, TE&L Sur., dry, TD 4,614 ft., elev. 1,079 ft., Caddo 3,200 ft.

Stonewall County: G. E. Kadane & Sons 1 B. E. Tatum, W. M. Smith Sur., A-444, dry, TD 6,166 ft.

Wilbarger County: E. H. Pigg 2 Waggoner Est., 100-14-H&TC, dry, TD 851 ft.

Young County: Clayton Goble 1 F. Scruggs, Sub. 1, Young CSL, A-1,285, dry, TD 302 ft.

Louisiana-Ark.

Operator Will Test Cotton Valley Prospect in Union

SHREVEPORT. — Carter Oil Co. has plugged back and cemented casing to test Cotton Valley sand at 1 Wilson-Slater unit, SW SE 9-18s-16w, wildcat west of Newell, Union County, Arkansas. The test is 2½ miles east of East Schuler field production. Operator set casing at 6,683 ft. and will test a sand stringer at 6,504-10 ft. On 1-hour drill-stem test of this zone, gas was to the surface in 24 minutes, recording top pressure of 6 psi. Recovery was 90 ft. of oil and gas-cut mud, 300 ft. of oil and 30 ft. of mud.

Kirby Petroleum Co. has an indicated confirmation at its recent discovery east of Smackover field in Union County. The company cored oil sands in the Meakin, Graves, and Blossom sands and has set production casing at B-2 Southern Co., in 18-16s-14w. Hole is bottomed at 2,689 ft. and pipe was set to 2,680 ft.

Louisiana.—Justiss-Mears Oil Co., Inc. perforated the Wilcox sand from 5,652-55 ft. and will test at B-5 Tensas Delta Land Co., C SW SE 28-5n-5e, southern Catahoula Parish wildcat. This wildcat lies 1 mile east of Saline Lake field, which produces from the Wilcox sands at about 5,500 ft.

LOUISIANA WILDCAT FAILURES

Concordia Parish: Barnett Serio et al 3 Quinn, C NE SW 24-4n-6e, dry, TD 7,520 ft.

Grant Parish: David K. Brooks and Gulf Refining Co. 1 USA, C NW SE 4-7n-1w, dry, TD 5,024 ft.

ARKANSAS WILDCAT FAILURE

Ouachita County: Atkins & Pannell 1 Gaughan, C SE SE 25-13s-18w, dry, TD 1,390 ft.

California

New Discovery Finaled In Los Angeles County

LOS ANGELES. — The Texas Co. completed a new oil discovery in Los Angeles County, about 1½ miles southeast of Santa Fe Springs and 2 miles northwest of West Coyote field. The wildcat, 10-1 McNally Ranch-B, pumped about 50 bbl. daily of 28.4°-gravity crude through 65 ft. of perforations at three intervals between 8,820-8,935 ft.

Located on the McNally Ranch, in an area which has been fairly well explored, the new discovery is expected to be named Leffingwell field. Site of the successful test is in SE 10-3s-11w.

On the northwest edge of West Newport field, Orange County, Sierra Oil Co. completed 2 Fransworth in the Bolsa "B" zone as a new fault-block discovery. Drilled to 3,501 ft. the wildcat pumped and flowed 206 bbl. of 26°-gravity crude through perforations at approximately 3,425-3,500 ft. The operator started 3 Farnsworth as a southeast offset to the discovery, which is in SE NW 12-6s-11w.

Sites for two wildcats near Oceanside in San Diego County were announced by Grober & Associates. Both tests will be drilled southeast of Oceanside, 1 Estes in 21-12s-4w and 1 Perry in 33-12s-4w.

East of Buena Park in Orange County, The Texas Co. has reentered the 10,020-ft. wildcat it abandoned last June as 1 City of Fullerton. Renamed 1 Mills, a straight hole will be drilled from below approximately 4,500 ft. As 1 City of Fullerton the wildcat, located in 36-3s-11w, had been drilled as a slant hole.

A development in the northern Coastal region was at Hollister, San Benito County, where a new gas discovery appeared likely. Balken & Krug 1 Ferry-Morse blew out while drilling at 2,470 ft. and flowed at the estimated rate of 5,000 M.c.f. daily before being brought under control. Producing interval was believed to be at 2,430-70 ft. Site of the potential discovery is in 20-12s-5e.

Monterey Oil Co. abandoned 1 Ansberry-Two in Paris Valley, Monterey County, and was preparing to start a second test about ½ mile northwest. The first test was dry at 1,660 ft., where it was bottomed in basal granitic conglomerate. The second test, 2 Ansberry-Two, will be drilled in 3-22s-9e.

In Cuyama Valley, C. W. Colgrove staked location for two wildcats and abandoned 67-22 Kirschenmann, attempted extensioner to the one-well Central Cuyama field, at 9,631 ft. In 4A-10n-26w equipment was being moved in for 22-4A Russell. The second test will be 82-16A Russell in 16A-11n-28w.

Nevada wildcat . . . Gulf Oil Co. was expected to shortly start a wildcat, 1 Dolly Varden unit, in Elko County, Nevada. Site will be about 11 miles north of Currie, in NE SE 36-30n-64e. It is to be a 10,000-ft. test, and will be drilled on acreage farmed out from Phillips Petroleum Co.

CALIFORNIA SUCCESSFUL WILDCAT

Los Angeles County, new field discovery (Leffingwell): The Texas Co. 10-1 McNally Ranch-B, 10-3s-11w, pumped 63 bbl of 28.4°-gravity crude from perforations at 8,820-50, 8,885-8,923, and 9,928-35 ft., 250 psi. casing pressure, TD 10,000 ft., plugged back to 9,027 ft., elev. 205 ft.

CALIFORNIA WILDCAT FAILURES

Kern County, Belgian anticline area: Tide Water Associated Oil Co. 58-19 Shamrock, 19-30s-22e, dry, Oceanic 6,117 ft., Rankin sand 6,563 ft., TD 7,486 ft., elev. 1,530 ft.

Devils Den area: M. J. M. & M. Oil Co. 2 University, 3-25s-18e, dry, TD 1,058 ft., elev. 595 ft.

Midway area: J. M. Gross 1-A Phelps, 29-31s-22e, dry, TD 850 ft., elev. 2,473 ft.

Temblor area: Aslin Oil Co., Inc. 69-J-12 "Well," 36-29s-20e, dry, TD 2,185 ft., elev. 1,750 ft.

Kings County, Pyramid Hills area: Ancora Corp. 4 Capital, 16-24s-18e, dry, TD 2,175 ft., elev. 669 ft.

Los Angeles County, Little Tujunga area: Intex Oil Co. 4 Cleeves, 33-3n-14w, dry, TD 4,250 ft., elev. 1,405 ft.

Witney Canyon area: Geo. D. Rowan, Opr. 3 Phillips, 7-3n-15w, dry, TD 671 ft., elev. 1,747 ft.

Monterey County, San Ardo area: Standard Oil Co. of California et al 75-21 Alexander-Maher, 21-23s-11e, dry, TD 3,527 ft., elev. 956 ft.

Santa Barbara County, Cuyama Valley area: C. W. Colgrove 67-22 Kirschenmann, 22-10n-26w, dry, TD 9,631 ft., elev. 2,295 ft.

Ventura County, Aliso Canyon area: Union Oil Co. X-7 ex-Mission, project 33-4n-22w, dry, TD 9,327 ft., elev. 1,695 ft.

Yolo County, Winters area: E. A. Bender 1 Wallace, 12-8n-1w, dry, TD 4,873 ft., elev. 125 ft.

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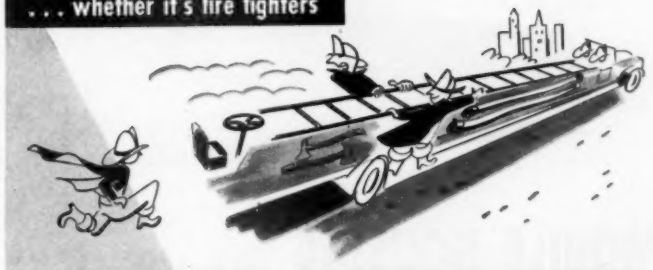

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Mississippi

New Wilcox Discovery Completed in Franklin

JACKSON.—A new Wilcox discovery has been completed in the southwest corner of Franklin County, Mississippi, at the Gulf Refining Co. 3 N. W. McCraine, Section 6-4n-1e. On 24-hour potential test this well pumped 72 bbl. of 32.6°-gravity oil plus 40 bbl. of salt water. Completion is from perforations 4,716-25 and 4,728-29 ft. opposite poorly developed upper Wilcox sand. Log and sidewall cores indicate another oil sand at 4,664-69 ft. which has not been tested.

In western Adams County, Mississippi, adjacent to the Mississippi River, the John S. Callon 1 Mrs. May F. Hodges et al, Section 10-6n-4w, has run production casing and is preparing to test good shows in the Wilcox. This wildcat was drilled to total depth of 7,013 ft. and 5½-in. casing was set at 6,250 ft. Subject test is located between Carthage Point and Esperance Point fields, and west of New Era field.

Approximately 6 miles northeast of Muldon field, Shell Oil Co. has run three drill-stem tests this past week and is now running another at 1 Mrs. Lee Harrington, Section 25-14s-6e, Monroe County. Recovery from test at 4,399-450 ft. was only 25 ft. of slightly oil and gas-cut mud. At 4,500-35 ft. recovery was 330 ft. of slightly gas-cut mud. Only a weak blow developed on each of these tests. Maximum top pressure of 2½ psi. was recorded on test at 4,565-652 ft. with recovery being mud and salt water. At last report hole had been drilled to 4,781 ft. in slightly porous dolomite and another drill-stem test was being run.

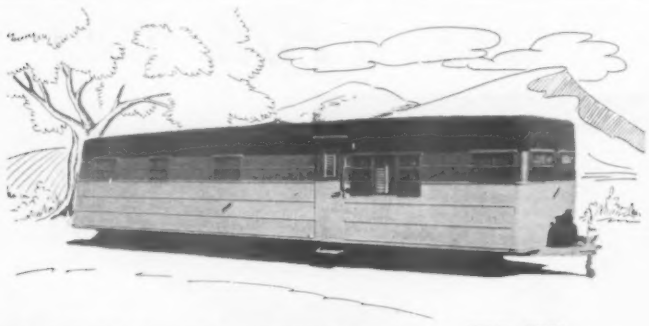
In Gillsburg field area of southeastern Amite County, Mississippi, Humble Oil & Refining Co. drilled 1 P. P. Willson, Section 22-1n-6e, to total depth of 11,925 ft. and set 7-in. casing at 11,882 ft. Top of lower Tuscaloosa was reported as being picked at 11,535 ft., which is 16 ft. higher structurally than the lower Tuscaloosa point reported in the field discovery well located approximately 1¼ miles south in Section 27. No detail information was released on the sand to be tested, but the most reliable rumors are that a 13-ft. lower Tuscaloosa "stringer" sand carried shows. It is also rumored that the bottom part of this sand was perforated and tested oil along with 40 per cent to 85 per cent water.

MISSISSIPPI SUCCESSFUL WILDCAT

Franklin County: Gulf Refining Co. 3 N. W. McCraine, 6-4n-1e, TD 6,806 ft., IP pumped 72 bbl. of oil plus 40 bbl. of salt water in 24 hours, 32.6°-gravity oil.

ALABAMA WILDCAT FAILURE

Conecuh County: L. Cashion Co. 1 W. A. Godwin, 35-5n-11e, dry, TD 4,909 ft.



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South Louisiana

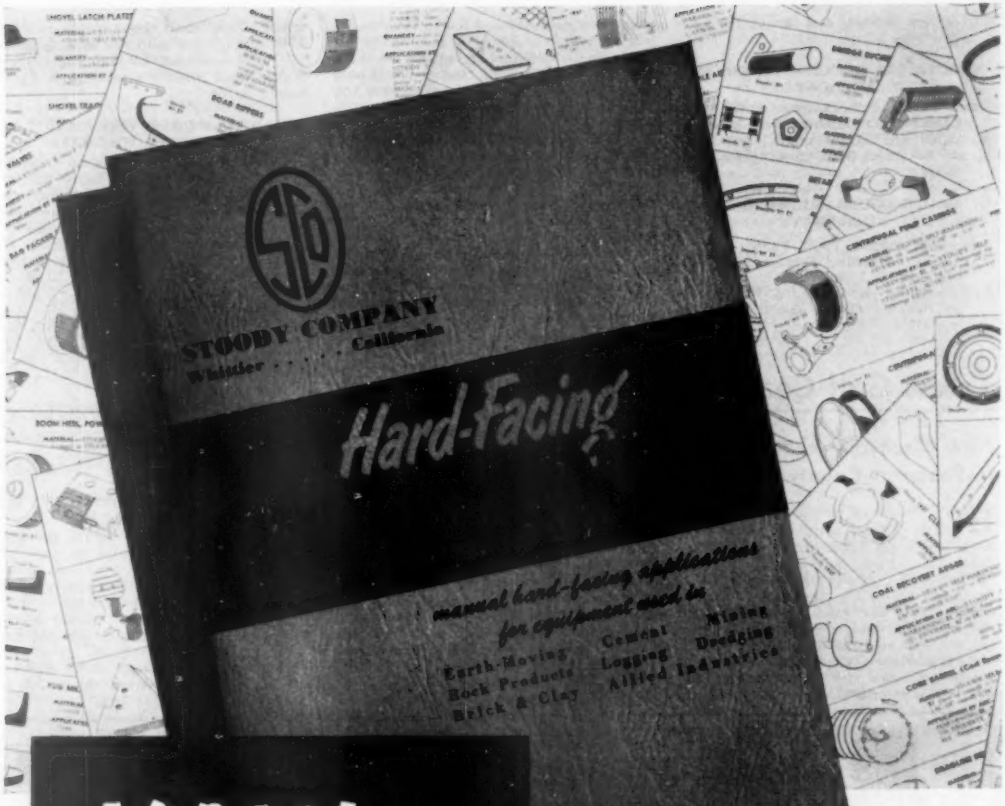
St. Landry Wildcat Flows Distillate on Drill-Stem Test

NEW ORLEANS.—On drill-stem test, Magnolia Petroleum Co. reported a flow of 23 bbl. of distillate daily at its 1 Armas Sylvester, St. Landry Parish, wildcat. Test was on a 9/64-in. choke, tubing pressure 600 psi., gas-oil ratio 9,300-1. Casing, cemented at total depth of 10,839 ft., was perforated from 10,776-790 ft. with 2½-in. tubing set on packer at 10,755 ft. Previous test, with packer at 10,742 ft., ¼-in. top and ⅛-in. bottom chokes, 5,000 ft. water cushion, well flowed water cushion for 3 hours under 1,000-psi. working pressure. Operator detected leak, closed and pulled the tool with no recovery. Location is 5 miles southeast of Ville Platte townsite, Section 139-5s-3e.

Testing operations are under way at two wells in the Southeast Pass area of Plaquemines Parish, Louisiana. Humble Oil & Refining Co. appears assured of a successful confirmation to Southeast Pass Field. Confirmation attempt is 1 State Lease 1927, which perforated 8,151-55 ft. On 14-hour drill-stem test of perforated interval, the well flowed at the rate of 76 bbl. of oil per day. Tubing pressure was 290 psi. and gas-oil ratio 1,775-1. Earlier the company perforated 8,806-13 ft. but drill-stem test recovered only 180 ft. of mud with trace of salt water and oil. Also in the Southeast Pass area, the company continues to test 1 State Lease 2090. Cores taken through the interval 8,486-561 ft. showed oil streaks and perforations have now been made opposite this zone. Testing is under way.

Two miles south of Edna, Jefferson Davis Parish, Bateman Drilling Co. and Est. of W. G. Helis, operating out of Houston, have announced location on an 8,500-ft. test in Section 34-7s-5w. New wildcat is also to be carried as 1 A. Hollins.

The California Co., New Orleans, has staked location for a 12,500-ft. wildcat test northwest of USC&GS Station "Pass 2," Lafourche Parish. Known as 1 Calco-Phillips-



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SOUTH LOUISIANA SUCCESSFUL WILDCAT

Acadia Parish: Union Sulphur & Oil Corp. 1 Dewey M. Harmon et al, 51-7s-2e, TD 11,208, IPF 53 bbl. of 52.2°-gravity oil per day on 12/64-in. choke, gas-oil ratio 26,320-1.

SOUTH LOUISIANA WILDCAT FAILURES

Assumption Parish: Texas Pacific Coal & Oil Co. 1 Gadchaux Sugars, Inc., 27-13s-14e, dry, TD 12,905 ft.

Plaquemines Parish: Richard & Bass 1 Texaco-Helis-Dr. Cortesi unit 1, 23-15s-15e, dry, TD 12,124 ft.

Texas Gulf Coast

New Discovery Reported In Brazoria County

HOUSTON.—New oil discovery in Brazoria County 2 miles northwest of the Danbury field is the Ralph Loew 1 J. M. Skrabanek. On 24-hour potential test, well flowed 259 bbl. of 38.1°-gravity oil per day on 11/16-in. choke with tubing pressure of 1,000 psi., casing sealed, and gas-oil ratio 672-1. The discovery sand was perforated with four bullets per foot at 7,876-88 ft. and packer set at 7,833 ft. Hole is bottomed at 9,650 ft. with top of pay called at 7,870 ft. After cementing of 5½-in. production string plug-back depth was measured at 8,100 ft. Prior to potential test, well flowed 7 bbl. of oil per hour under pressure on tubing of 1,150 psi. on ¼-in. choke during a 12-hour test. Open hole drill-stem test at 7,870.5-78 ft. with tool open 30 minutes flowed oil in 28 minutes under working pressure of 300 psi. Well was cored 7,861-65.5 ft. with recovery of 3 ft. of shale and ½ ft. of sand and sandy shale with oil odor; 5 ft. of sand with oil odor at 7,865.5-70.5 ft.; and 2 ft. of oil sand pulled from 7,870.5-76 ft. Location is 9 miles northeast of Angleton on the DL&C Survey, A-604.

Commercial Petroleum & Transport Co. has reported absolute open flow potential on 1 Marcus D. Huebner, 1 mile southwest extension of South Lucky field in Matagorda County, 3 miles southwest of Bay City. Through perforations at 9,228-34 ft., well flowed 16,500,000 cu. ft. of gas per day under gas-liquid ratio of 79,200-1. Gravity of the distillate is 60°. Well is shut in under pressure of 2,570 psi. Hole is bottomed at 9,537 ft. with 5½-in. casing cemented at 9,537 ft. and 2-in. tubing swung at 9,181 ft. Prior to plugging back for completion attempt in the 9,228-ft. Frio section, firm tested 25 per cent oil and 10 per cent wash water through interval 9,435-45 ft. with tubing pressure of 750 psi. That interval later tested 40 to 50 per cent oil after several squeeze jobs but went to 89 per cent salt water. Location is on the Peter Bertrand Survey, A-5.

Atlantic Refining Co. has announced location for an immediate 9,500-ft. wildcat in the North Bancroft area of Newton County at C-3 Kirby Lumber Corp. 10¼ miles east of Call and 8,460 ft. west-southwest of well C-2. Exact location is on the John Pleasants Survey, A-349.

In Wharton County J. M. Flaitz and R. B. Mitchell have filed 1 Guess unit as an 8,000-ft. wildcat, .2 mile southwest of Magnet and 1½ miles southeast of the East Magnet Withers field. Drill site is on the S. A. Larche Survey, A-268.

TEXAS GULF COAST (DISTRICTS 2 & 3) SUCCESSFUL WILDCATS

Harris County: Oil & Chemical Products, Inc. 1 Jessie A. Tucker, H&TC RR Sur., TD 7,335 ft., IPF 128.34 bbl. of oil plus 100,000 cu. ft. of gas per day on ⅛-in. choke, 39°-gravity, gas-oil ratio 780-1.

Orange County: Magnolia Petroleum Co. G-1 Lutcher & Moore "G," Benj. Johnson Sur., TD 9,300 ft., IPP 22 bbl. of 36°-gravity oil per day, plus 12 bbl. of salt water, gas-oil ratio nil.

Victoria County: Union Producing Co. et al A-31 McFadden, J. M. Valdez Sur., A-115, TD 8,586 ft., IPF 120.37 bbl. of oil per day on ⅛-in. choke, 41.4°-gravity oil, gas-oil ratio 1,351-1.

Wharton County: Progress Petroleum Co. of Texas 1 B. L. Franke, I&GN RR Sur., TD 6,011 ft., IPF 45.7 bbl. of oil per day on 12/64-in. choke, 33°-gravity oil, gas-oil ratio 32,800-1.

TEXAS GULF COAST (DISTRICTS 2 & 3) WILDCAT FAILURES

Bee County: Cities Service Oil Co. B-1 Magnus Beck B, J. B. Morrow Sur., dry, TD 9,003 ft.

Morris Cannan 1 J. F. Borroum, J. Brown Sur., A-113, dry, TD 7,070 ft.

Chambers County: Jack W. Frazier et al 1 Mattie F. Jones, H&TC RR Co. Sur., A-122, dry, TD 8,017 ft.

Fort Bend County: Second M. E. Andrews, Ltd., 1 Geo. W. Armstrong Est., James Scott Lge., dry, TD 7,518 ft.

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Michel T. Halbouty 1 Millie S. Brown, Wm. Little Sur., A-54, dry, TD 8,028 ft.

Harris County: The Texas Co. 1 J. Golbow, R. N. Davis Sur., A-225, dry, TD 8,200 ft.

Jackson County: John S. Neilson & W. E. Walker 1 Mrs. A. Cornish, Jas. Small Sur., dry, TD 9,908 ft.

Karnes County: Martin, Shelley & Thomas 1 Alex Pawlek, Wm. Twomey Sur., A-283, dry, TD 6,119 ft.

Lavaca County: Magnolia Petroleum Co. 1 Simpson Heirs, Amanda de la Croix Sur., dry, TD 15,000 ft.

Matagorda County: Intex Oil Co. 1 Marvin Countryman unit, I&GN RR Co. Sur., A-319, dry, TD 8,823 ft.

The Texas Co. 1 Buckner Orphan's Home NCT-1, Andrew Smalley heirs Sur., A-90, dry, TD 11,599 ft.

Southwest Texas

Potential Taken at Duval County Wildcat

CORPUS CHRISTI.—Effected through perforations 6,047-50 ft., Edwin W. Pauley has potentialed the 1 Anges Nelson Marshall et al, wildcat in Duval County, for 16.8 bbl. of 44.1°-gravity oil per day through ¼-in. choke. Gas-oil ratio was 561-1 with tubing pressure 130 psi. with fluid being 20 per cent water. Drill-stem test on this section revealed 3,950 ft. of pipe line oil with 600 ft. salt water and 60 ft. gas-cut mud. Also test on perforations 6,047-50 ft., flowed rate of 150 bbl. of 45°-gravity oil per day on 3/16-in. choke. Discovery is producing from the third sand in the Hockley zone. Producer was drilled to total depth 6,085 ft. with 5½-in. production string cemented to bottom. Discovery is located 4½ miles north of Concepcion on the "La Huerta" Jose Antonio Gonzales Survey, A-227.

New Mirando sand discovery known as the 2 Lucille Gruy Estate, wildcat in Duval County, has been potentialed by Appell Drilling Co. and George W. Lyles. Discovery was potentialed on absolute open flow for 2,200,000 cu. ft. of gas per day and on 5/16-in. choke well flowed 1,888,000 cu. ft. of gas per day with tubing pressure 499 psi. and on ¼-in. choke flowed 870,000 cu. ft. of gas per day with tubing pressure 632 psi. Production was gotten through perforations shot 2,668-70 ft. with bottom of hole being 4,015 ft. and 5½-in. production string cemented to 2,730 ft. Mirando sand was topped 2,665 ft., Cole 1,816 ft., Chernosky 2,166 ft., Argo 2,293 ft. Government Wells 2,471 ft., and Rosenburg at floor. Operations are on the M. E. Gussett Survey 394, A-1125.

Magnolia Petroleum Co. has abandoned its 1 Simpson heirs, Lavaca County wildcat. Operators drilled to total depth 15,000 ft. and ran 7-in. pipe to 11,188 ft. with 5-in. liner run to 10,010 ft. Operators then started to perforate section after section in order to reveal something of commercial value but after many tests nothing could be found that would produce commercially. This is an old well as it was spudded in December 1951 and plugged as failure in November 1952. Only oil show in the deep test was from 8,640-ft. zone where drill-stem test showed recovery of 90 ft. of oil and rat-hole mud cut with gas. Slight trace of gas and distillate showed on tests of 4 zones from 9,694-13,817 ft. Failure lies on the Amanda de la Croix Survey, A-112.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS

Duval County: Appell Drilling Co. & Geo. W. Lyles 2 Lucille Gruy Est., M. E. Gussett Sur., A-1,125, TD 4,015 ft., IPF open flow 2,200,000 cu. ft. of gas per day, ⅞-in. choke.

Edwin W. Pauley et al 1 Agnes Nelson Marshall et al, "La Huerta" Jose Antonio Gonzales Sur., A-227, TD 6,084 ft., IPF 106.8 bbl. of oil per day on ¼-in. choke, 44.1°-gravity oil, gas-oil ratio 561-1.

Kenedy County: Pure Oil Co. 1 State of Texas Tr. 284, Laguna Madre Tr. 284, TD 8,712 ft., IPF 181.91 bbl. of oil plus 146,000 cu. ft. of gas per day on 15/64-in. choke, 38.4°-gravity oil, gas-oil ratio 820-1.

Nueces County: Phillips Petroleum Co. 1 State Tract 750, Nueces Bay Tract 750, TD 9,000 ft., IPF 131.81 bbl. of oil per day on 9/64-in. choke, 42.2°-gravity oil, gas-oil ratio 645-1.

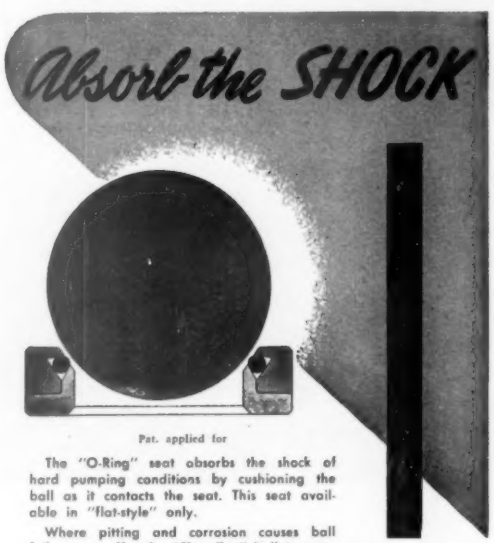
Starr County: Magnolia Petroleum Co. 1 W. T. Neblett, E. Benadito Grant, TD 6,000 ft., IPF 60 bbl. of oil per day on 6/64-in. choke, 49°-gravity oil, gas-oil ratio 2,900-1.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Atascosa County: Martin, Shelley & Thomas 2-A C. L. Downey, Noah Scott Sur., dry, TD 5,346 ft.

Caldwell County: C. L. Riddle 1 J. M. Riddle, A. Lytton Sur., dry, TD 2,332 ft.

Duval County: C. G. Glasscock 1-A John



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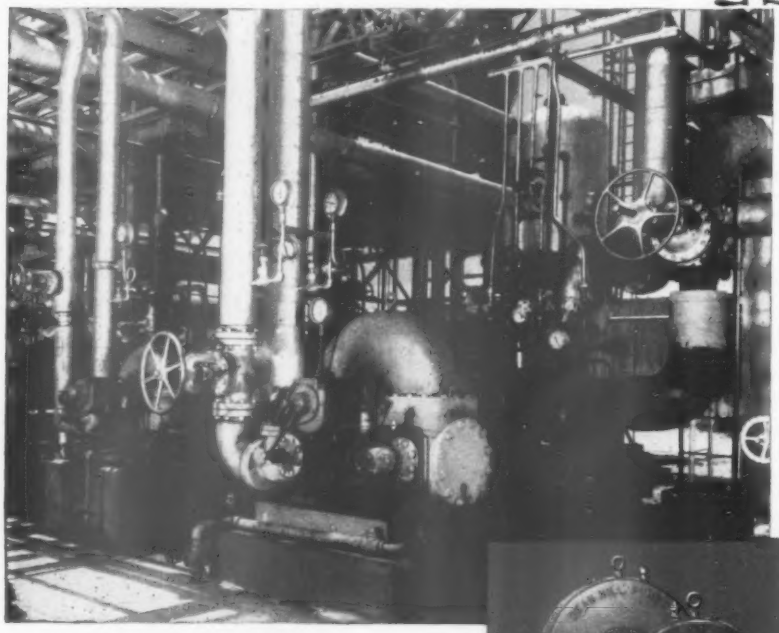

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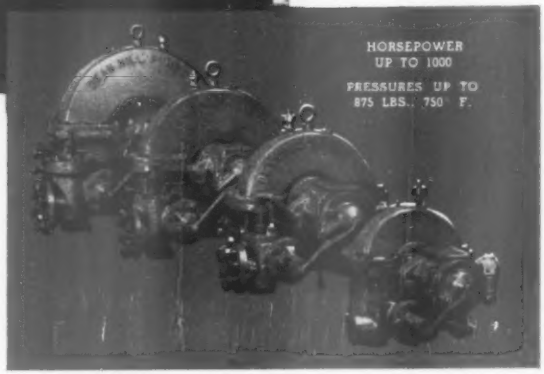

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Dunn, Diego Hinojosa Grant, A-629, dry, TD 3,850 ft.

J. W. Gorman 2 N. A. Hoffman, Diego Hinojosa Grant, A-629, dry, TD 4,932 ft.

Hidalgo County: Sun Oil Co. 1 E. M. Ryman et al, G. O. Newmans Subd., dry, TD 6,972 ft.

Nueces County: Renwar Oil Corp. & Shelby Walker 1 F. G. Engles, Laurles Farm Tracts, dry, TD 6,216 ft.

Starr County: Sun Oil Co. 1 S. Salinas, Porcion 109, dry, TD 3,010 ft.

Wilson County: Gasoline Producing Corp. 1 William Reinhardt, Francisco Herrera Sur., dry, TD 2,575 ft.

Oklahoma

Washita County Wildcat Tests Gas and Distillate

SHELL OIL CO.'s indicated new Anadarko-basin, gas-distillate discovery well, 1 Adams, C SE SE 6-9n-19w, 6 miles west of Dill, in western Washita County, flowed 21 bbl. of 53°-gravity distillate during a late 8-hour test with gas production at the rate of 1,948,000 cu. ft. per day. The test followed opening of additional pay zone with casing perforations taking in an interval at 11,022-092 ft. Further testing has been delayed temporarily by a fishing job to recover packer. Pay zone is in hole drilled to 12,500 ft., and in which casing was run to 11,475 ft. Location is 5 miles southeast of the Elk City field, nearest other production.

Parker Drilling Co. is continuing tests of its 1 Boyd Miller, another indicated Anadarko-basin discovery well, located 3 miles north of Independence, in Custer County. Spot location is in the C NE SW 22-15n-16w. In tests of casing perforations at 11,510-65 ft., in the upper part of a Springer sand zone, the well is reported to have flowed at rates up to 1,500,000 cu. ft. per day but production declined steadily to around 50,000 cu. ft. per day. Swabbing recovered 4 bbl. of distillate in one 12-hour period. Operators since then have reperforated casing in the interval at 11,530-62 ft. for additional tests.

Discovery last June of production in Bartlesville sand in the area, now designated as the East Guthrie Lake pool, 5 miles east of Guthrie, in Logan County, is being confirmed by Davidor & Davidor at their 1 Oliver, SW SW SW 3-15n-2w, southeast offset to the discovery well. The new well, second for the pool, flowed 169 bbl. of oil in the first 8 hours after a formation-fracturing treatment. Later, with flow restricted to a 14/64-in. choke, it produced at the rate of 12 bbl. per hour. Pay is open through casing perforations at 5,580-92 ft.

Carter Oil Co. has run casing to test indicated Misener production in its 1 Bedford, C NW NW 29-24n-4w, first confirmation well for the recently opened South Hunter pool, in Garfield County. This well, south offset to the discovery producer, also drilled by Carter, got a good gas and oil flow and recovered 960 ft. of oil in a 25-minute drill-stem test of the prospective pay zone at 6,166-85½ ft. Another drill-stem deeper in the pay at 6,185-96 ft. was not so promising but had a gas flow in 32 minutes and recovered 30 ft. of oil and 10 ft. of heavily oil and gas-cut mud. The Marshall zone, which also tested oil in the discovery well, showed salt water in the confirmation well. Total depth is 6,300 ft. with casing run through the Misener.

Davon Oil & Gas Co. has a possible discovery well in Pennsylvanian sand at its 1 Thompson, SW SE NE 10-3n-1e, just east of Pauls Valley, Garvin County. Operators have perforated casing in the sand at 3,208-16 ft. and have acidized, and are setting pumping equipment for completion. No productivity tests were made but a prior drill-stem test, taking in an interval at 3,213-34 ft., recovered 150 ft. of 25°-gravity oil. The well was drilled to 3,367 ft., and has bottom of casing at 3,318 ft. Location is west of production of the East Pauls Valley field.

Another ½-mile extension of production has been made on the east side of the West Haydenville pool, in Okfuskee County. Wolfe Drilling Co. and associates 1 Sowder, the extension well, producing from open hole at 2,962-73 ft. in the lower Dutcher sand, flowed at the rate of 9 bbl. of oil per hour after a formation-fracturing treatment. Spot is in the NW NW SE 30-13n-10e.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: Cities Service Oil Co. 1 McCurley unit, C SW NE 19-3n-1w, flowed 199 bbl. of oil from sand at 5,256-65 ft., TD 6,495, PBTD 5,295 ft., 44.2°-gravity oil.

McClain County: Sinclair Oil & Gas Co. 1 Community Willie Smith, C SW NW 17-5n-4w, flowed 1,463 bbl. of 45°-gravity oil from the McLish at 11,240-305 ft., TD 12,495 ft., PBTD 11,360 ft.

Osage County: C. W. Oliphant 1 Osage, C SW SE 31-26n-5e, 40 bbl. of oil from Mississippi chat at 3,283-3,313 ft., TD 3,316 ft.

OKLAHOMA WILDCAT FAILURES

Cimarron County: Colorado Oil & Gas 1

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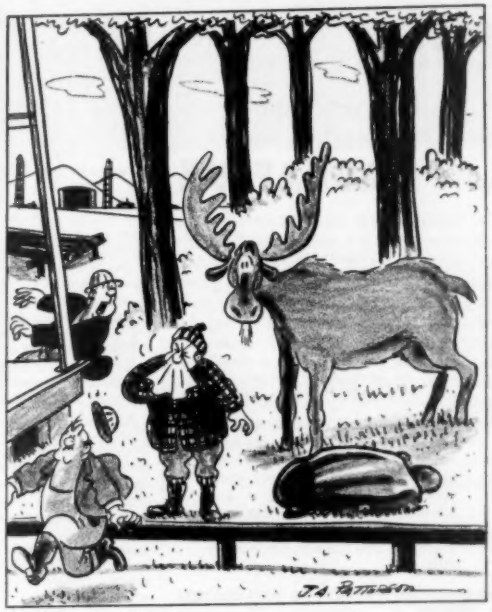

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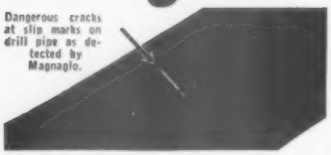

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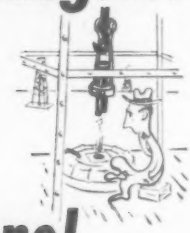

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State, C SW NW 14-5n-5eCM, dry, TD 5,277 ft.

Cotton County: Jim Fish Drilling Co. 1 Doty, SW SW NE SE 14-4s-13w, dry, TD 2,317 ft.

Grant County: Dennis H. Petty 1 Zeman, C SW SE 4-27n-5w, dry, TD 5,557 ft.

Harper County: Lynn Drilling Co. et al 1 White, C SE SE 3-25n-20w, dry, TD 7,212 ft.

Kay County: Meat Production Co. 1 Graham, NE SE SE 24-27n-4e, dry, TD 3,038 ft.

Lincoln County: W. A. Delaney, Jr. 1 Dunmire, NE NW SE 28-15n-4e, dry, TD 5,026 ft.

Davon Oil & Gas Co. 1 Hublitz, SW SW NE 36-14n-3e, dry, TD 4,512 ft.

E. L. Alford 1 Hoffman-Rooney, SW SW NE 19-16n-2e, dry, TD 5,326 ft.

Noble County: H. E. R. Drilling Co. and Carter Oil Co. 1 Madden, NW SW NE 35-21n-2w, dry, TD 5,460 ft.

Payne County: Josaline Production Co. 1 Bostian, NW SW SW 10-17n-1e, dry, TD 5,212 ft.

E. L. Oliver 1 Howell, NW NW SE 17-17n-4e, dry, TD 4,410 ft.

Seminole County: F. A. Gillispie & Sons 1 Aldridge, NW SE NE 35-11n-7e, dry, TD 3,624 ft.

Stephens County: Continental Oil Co. 1 Gearhart, NE SE NW 33-2s-4w, dry, TD 7,500 ft.

D&L Oil Co. and Russell Cobb 1 Federal Land Bank, NE NW SE 9-2s-7w, dry, TD 4,105 ft.

Woods County: Beach & Talbot 1 Thornberry, C NW SE 21-27n-14w, dry, TD 6,765 ft.

Rocky Mountain

Additional Shows Reported At Bottineau Wildcat

DENVER.—Additional shows in formations unofficially reported as Mississippian in the Zack Brooks-Crawford Smith 1 Berentson, C SW SE 12-163n-83w, Bottineau County, North Dakota, have kept this wildcat the center of current interest in the Rocky Mountain region.

The operators cored 50 ft. of limestone with fair to good shows of oil from the zone 3,347-97 ft., and 41 ft. of lime with a fair oil show from 3,397-3,438 ft. Drill-stem test of the interval 3,353-3,448 ft. had an immediate strong blow, with a recovery of 186 ft. of slightly to very heavily oil-cut mud, with flowing pressure zero, and shut-in pressure 450 psi. Tool was open only 12 minutes.

Core from 3,438-83 ft. had a good oil show in the top 10 ft., and core 3,483-3,527 ft. was anhydrite and dolomite with no show. The operators are reported coring below 3,527 ft.

The west side of the Williston basin, in Montana showed heavy interest in areas not generally considered within the basin at competitive bidding on state lands offered for sale in Helena last week. Bids of as much as $86.50 per acre were offered as bonus for lands 15 miles east of Freedom Dome, Garfield County, where there has been no previous drilling. Another tract in Phillips County, 45 miles northeast of Malta, brought $65.00 per acre. Others offered brought lesser prices, but a surprising good reception was met in the bidding for lands west of previous production through central Montana.

The recent apparent discovery by Continental Oil Co. at 1 Fast, C NE SE 14-30n-46e, Roosevelt County, is regarded by some observers as instrumental in stirring interest in areas through this portion of the state which were not previously highly regarded.

The Continental wildcat is at 6,448 ft. total depth, and is waiting on casing for completion following test at an estimated rate of 20 bbl. of 31°-gravity black, sweet oil from the zone 6,414-48 ft. Six and one-half feet of saturated porous limestone was reported in top of core 6,428-48 ft. The 8 ft. below the saturated section was tight, stained.

In Wyoming, Stanolind Oil & Gas Co. has reported a gage of 169 bbl. of oil per day from Mesaverde sand at the 1 Unit, SW NE NE 10-12n-103w, Sweetwater County. The well was drilled to 8,506 ft., plugged back to 7,800 ft. to become the first significant producer from this formation in this portion of the Rockies. It is at the present time the world's highest producing oil well with a ground elevation of approximately 9,350 ft.

Husky Oil Co.'s second venture in the Five Mile area of Big Horn County, Wyoming, the 1 Government, SE NW SW 12-49n-94w, 3½ miles northwest of the discovery in the area has plugged back to test Muddy sand at 10,675-95 ft., after finding Phosphoria shows noncommercial. Phosphoria produced sour gas with approximately 50 bbl. of distillate per million cubic feet in the discovery well.

Other important abandonments in Wyoming included Gulf Oil Corp.'s 1 Davis, C SW SW 34-51n-72w, in the Gillette area of Campbell County, at 10,938 ft.; Phillips Petroleum Co.'s wildcat in NE SE NE 7-34n-75w, in the Sand Creek area of Converse County, at 11,564 ft.; and Bay Petroleum's 1 Government, SW SW NE 19-43n-81w, in the Kaycee area, Johnson County.

Heavy weather, approaching blizzard proportions in the Denver-Julesburg basin of Colorado and western Nebraska slowed operations and delayed new starts in the area last week. Rigs were immobilized in most areas of this basin so far as movement to new locations were concerned.

On the southeast side of the basin Continental has spudded another in its series along the Las Animas arch, at 1 Fergus-State, C SE SE 36-18s-48w, in the South Eads area of Kiowa County. A series of four wells has resulted in one small gas discovery in Pennsylvanian in this area.

COLORADO WILDCAT FAILURES

Logan County: A. A. Buchanan et al 1 Kuehl et al, NW NW NE 22-10n-52w, dry, TD 5,270 ft.

Ryan Oil Co. and Falcon-Seaboard 1 Good, C SW SW 13-9n-54w, dry, TD 5,175 ft.

Lee Swedlund and Falcon-Seaboard 1 Hughbanks, SE SE SW 7-7n-54w, dry, TD 5,479 ft.

Morgan County: Sherrod & Apperson 1 State, SE NE SE 16-4n-60w, dry, TD 6,387 ft.

Twin Oil Co. and J. W. Dennison et al 1 Dilley, SW SE SW 13-6n-55w, dry, TD 5,314 ft.

Saguache County: W. F. Carr 1 Kennedy-Williams, C SW 11-41n-9e, dry, TD 6,200 ft.

Snowden et al 1 Killiam, CN½ NE NW 18-41n-9e, OWDD, TD 3,985 ft.

Snowden et al 1 Johnson, NW NW SE 20-42-9e, San Luis area, junked hole, TD 700 ft.

Orin Tucker et al 1 Tucker Thomas, NE NE NE 13-41n-8e, San Luis area, suspended, TD 8,024 ft.

MONTANA WILDCAT FAILURE

Phillips County: Continental Oil Co. 1 Government, C SE NE 17-23n-25e, dry, TD 3,634 ft.

NEBRASKA WILDCAT FAILURES

Morrill County: C. G. Glasscock 1 Keenan,

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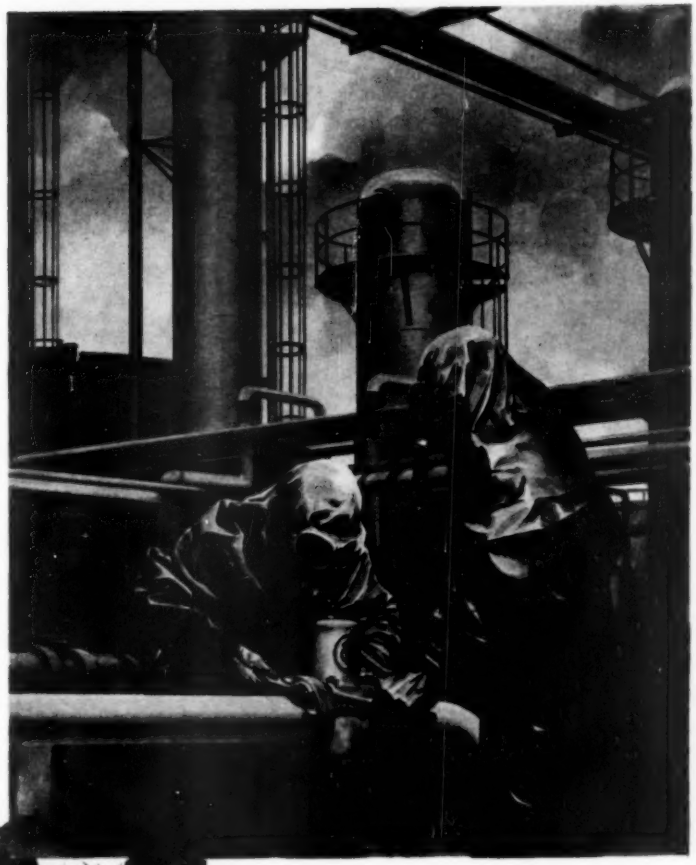

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The actual owners of Standard Oil Company of California now number 115,942—which is 17,000 more than just two years ago. They include 283 universities and other educational institutions; 236 churches and religious organizations; 1825 small and large businesses; 159 hospitals and other medical groups; 10,876 employees of the Company, and 102,563 other individual citizens, few of whom could be called rich. The great number of our shareholders are people like your own friends and neighbors—yourself, perhaps—mechanics, clerks, farmers, white-collar men, widows, men and women who have retired. ¶ In another sense, of course, the "owners" of Standard are our customers. You *control* the Company by your choice of brands, and you *benefit* by the quality and economy of the products we sell. The only way Standard can look after the interests of its shareholders is by making sure that Standard serves *you* well.

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NE NW NE 14-18n-50w, dry, TD 4,219 ft.

Sioux County: J. Ray McDermott Co. 1 Clara Ruth, C SW NW 22-30n-56w, dry, TD 4,890 ft.

NORTHERN NEW MEXICO WILDCAT FAILURE

San Miguel County: Newton R. Roberts 1 Aaron, C SW SW 14-11n-15e, dry, TD 4,395 ft.

NORTH DAKOTA WILDCAT FAILURES

Burleigh County: Continental Oil Co. 1 McCay, NW NW NW 32-137n-76w, dry, TD 6,182 ft.

Continental Oil Co. 1 Dronen, C NE NE 9-140n-75w, dry, TD 6,155 ft.

Ward County: Stanolind Oil & Gas Co. 1 Waswick, C SW NE 2-153n-85w, dry, TD 11,009 ft.

UTAH SUCCESSFUL WILDCATS

Carbon County: Pacific Western Oil Co. 3 Unit, NW SW SE 19-14s-8e, Gordon Creek, flowed 1,500 M.c.f. of gas per day from Ferron sand, new pay, TD 4,308 ft.

Duchesne County: Deep Well Production Co. 1 Lambert, C SW SW 22-8s-16e, South Myton, pumped 6 bbl. of oil per day from basal Green River, TD 7,140 ft.

UTAH WILDCAT FAILURE

Carbon County: Cities Service Oil Co. 1 Unit, C SW NW 6-13s-17e, Peters Point, dry, TD 8,309 ft.

WYOMING WILDCAT FAILURES

Converse County: Phillips Petroleum Co. 1 Sand Creek, NE SE NE 7-34n-75w, dry, TD 11,564 ft.

Johnson County: Bay Petroleum Co. 1 Government, SW SW NE 19-43n-81w, dry, TD 4,141 ft.

Sinclair Oil & Gas Co. 2 Unit, NE NW NE 18-41n-78w, dry, TD 8,108 ft.

Laramie County: Anderson-Prichard Oil Corp. 1 Wilkinson, NW NW SW 5-14n-60w, dry, TD 7,625 ft.

Moore & Gilmore 1 Nimmo Livestock, NE NE NE 18-17n-67w, dry, TD 2,521 ft.

Central Area

ILLINOIS

A good oil discovery is indicated in northwestern Wabash County where Wilbur L. Griffith and Jack Hirsch are testing their 1 Pixley heirs, NE NW SW 24-1n-14w. The well, located 4 miles east of West Salem and more than a mile from nearest other production, flowed gas and clean oil during a previous drill-stem test of the indicated pay zone, O'Hara lime. Recovery after the test was 740 ft. of clean oil and 80 ft. of oil-cut mud without water. Saturation is at 2,850-54 ft., total depth, with bottom still in the pay. Hole is open below 2,847 ft.

D. B. Lesh Drilling Co. 1 Schoeman, SE NW NE 27-4s-9e, a new oil-discovery well, located 4 miles northwest of Carmi, in White County, is being completed on the pump making 150 bbl. of oil per day. Pay is in Aux Vases sand at 3,165-71 ft. Total depth is 3,175 ft. Location is a mile from other production in the Carmi area.

INDIANA

Production of the North Princeton pool in Gibson County is being extended ½ mile northward by George & Wrather and associates at their 1 Kingsburg, SW NW NE 31-1s-10w, where productivity tests are under way. Pay zone is O'Hara lime, opposite which casing is perforated at 2,019-27 ft. A previous drill-stem test of the zone with tester open 30 minutes flowed gas in 7 minutes and clean oil in 22 minutes. Total depth is 2,093 ft. with casing run through the pay to 2,065 ft. Location is 2 miles north of the Princeton townsite.

Pure Oil Co. 1 Hale, NE NE NE 3-4s-13w, a wildcat 2 miles northeast of New Harmony, northwestern Posey County, has logged promising oil showings in Benoist sand and O'Hara lime. The well is approximately ¼ mile southeast of a recently completed McClosky discovery well drilled by Calvert Drilling, Inc. In a 2-hour drill-stem test of Benoist sand at 2,672-2,700 ft., the Pure well got 2,100 ft. of gas, 300 ft. of oil, and 510 ft. of mud-cut oil with 360 ft. of salt water. A similar test of the O'Hara at 2,866-88 ft. got 1,440 ft. of gas, 12 ft. of gas-cut mud, and 90 ft. of oil-cut mud (slightly salty).

WESTERN KENTUCKY

S. W. Bardill and associates have completed a new Tar Springs discovery well in the northeast tip of McLean County. The well, 1 Owens, NE SE NW 6-M-30, pumped 22 bbl. of oil per day following a 50-quart shot. Total depth is 1,397 ft. with saturation at 1,373-95 ft. Location is north of the Barrett Hill field.

EASTERN KENTUCKY

On the waters of Sand Lick in Powell County and in Pilot pool, Hall and Palmer have completed their 3 P. Y. Drake heirs as a 20-bbl. pumper from the Corniferous lime topped at 1,156 ft. and bottomed at 1,184 ft.

Kentucky West Virginia Gas Co. have completed 991 J. M. Taylor as a gas well.

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Located on Big Branch in Pike County sector of Big Sandy gas field the well tested 1,019,000 cu. ft. of gas daily from the Big lime (Mississippian) formation at a total depth of 1,823 ft. Top of lime was penetrated at 1,641 ft. Well was brought in natural.

MICHIGAN

A major northeast extension of Ravenna Traverse oil pool, Muskegon County, where three producers have been completed, appeared likely at the Clyde B. Miller 1 Hinsley School, SE SE NE 25-9n-15w, Sullivan Township, Muskegon County, an outpost almost 2 miles west of the field discovery well and just over a mile northwest of the most recent and closest producer in the pool. Top of Traverse lime was logged at 1,834 ft. and hole showed seven bailers of free oil, with a good gashead on an overnight fill-up test at 1,836 ft. Deepened 1 ft. to 1,837 ft., well showed a good increase in gas and it was believed that well was filling fast with oil, but since well had been drilled in without a string of 5-in. casing in the hole, control head was shut in immediately when the gas increase was noted. Outpost will be cased and tested at once, but it is not expected that these operations will be completed within less than 5 days.

The second Richfield oil well in West Branch field, Ogemaw Township, Ogemaw County, was completed in that objective and rated good for 45 bbl. of oil a day, flowing, after acid treatment with 6,000 gal. This new producer, the east 40-acre offset to the Richfield zone discovery, is the Charles Morley 1 Harrington, C SW SE 14-22n-1e. Hole was drilled to 4,241 ft. Well swabbed from 9 to 37 bbl. of oil a day natural before being acidized.

Moco 1 Ortwein, SW NW NE 7-14n-7w, Wheatland Township, Mecosta County, the direct west 10-acre offset to a discovery well, now abandoned, drilled by Smith Petroleum Co. in 1945, showed 2,000 ft. of free oil natural from the Dundee overnight at 3,678 ft., total depth. Top of Dundee was logged at 3,675 ft. and pay showed at 3,677 ft. Well will be pumped natural. The 1945 discovery resulted in dry holes being drilled to the north, south, northwest and east. This is the first test to the west.

ILLINOIS SUCCESSFUL WILDCATS

Washington County: Collins Brothers 3 Stricker-Meinert, NW SE NW 10-2s-2w, IP 50 bbl., Devonian 3,055-71 ft. and Trenton 4,093-98 ft., TD 4,192 ft. (opens new pay zone—Trenton lime—Beaucoup pool).

White County: Ashland Oil & Refining Co. and C. E. O'Neal 1 Bingman heirs, SW NW SE 19-5s-14w, IP 168 bbl., Waltersburg 2,308-13 ft., TD 2,313 ft. (opens new pay zone and extends Maunie North pool).

ILLINOIS WILDCAT FAILURES

Bond County: H. F. Gibson 1 Weiss, SW SE SE 22-4n-4w, dry, TD 2,401 ft.

(Continued on page 183)

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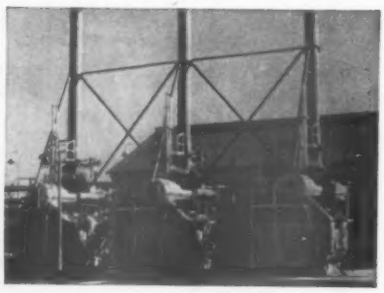

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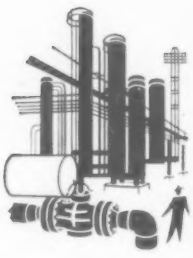

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Deep Maryland Test Completed As Dry

PITTSBURGH.—In Garrett County, Maryland, New York State Natural Gas Corp. 2-N-247 Shaw resulted in a dry hole and will be plugged and abandoned. The elevation of this well is 2,438 ft., Onondaga 3,773 ft., chert 3,790 ft., sour gas 6,075 ft., and gas at 7,140 ft. The initial test was 116,000 cu. ft., after shot increased to 225,000 cu. ft., and blew down to 15,000 cu. ft., when it reached a total depth of 7,162 ft. W. H. and A. A. Rader 1 Pleasant Valley Church, elevation 2,470 ft., after a fishing job, shut down at 3,958 ft. The depth of the chert has been corrected to 3,903 ft.

West Virginia.—Harvey district, Mingo County, West Virginia, United Fuel Gas Co. 6806 Fee, resulted in 4,369,000 cu. ft., gas in the Big Injun sand and shale, TD 3,120 ft. Sherman district, Calhoun County, McIntosh & Grimm 2 A. Hardeman, gaged 1,284,000 cu. ft., gas in the Berea sand, TD 1,874 ft. Portland district, Preston County, Cumberland and Allegheny Gas Co. 4-480 Cora E. Lewis, elevation 2,239 ft., had an open flow of 250,000 cu. ft. gas, chert 4,875 ft., Oriskany sand 5,692 ft., TD 5,834 ft.

Pennsylvania.—Unity Township Westmoreland County, southwest Pennsylvania, Peoples Natural Gas Co. 4003 A. J. Dotterway, depth 8,692 ft., encountered a bad hole and is straightening at 8,370 ft. 4008 J. R. Frola, is drilling at 6,708 ft. Greenville Township, Somerset County, New York State Natural Gas Corp. 1-320 M. V. Newman is shut down at 341 ft.

MARYLAND WILDCAT FAILURE

Garrett County: New York State Natural Gas Corp. 2-N-247 Shaw, elevation 2,438 ft., dry, chert 3,790 ft., show gas 6,075 and 7,140 ft., TD 7,162 ft.

OHIO

The Preston Oil Co. 1 Blanche Foucht, Section 18, Hopewell Township, Perry County, an east extender to Thorn pool, made a fair showing natural, and 60 bbl. in 24 hours after a 70-qt. shot. Clinton sand was logged at 2,728-54 ft.

Waverly Oil Co. extended Hanover pool 2,000 ft. to the west with a 55-bbl. producer on 1 Cordray, Lot 10, Hanover Township, Licking County. Clinton was found at 2,660-2,730 ft. with a good showing natural.

Mid East 2 Delmasso, Section 24, Jackson Township, Knox County, with sand at 2,850-2,905 ft. made 8 bbl. natural and 120 bbl. in 24 hours after shot.

H. A. Dempsey 1 Lewis Lassey, Section 15, Royalton Township, Cuyahoga County, a west offset to the 1 Brothers, topped the Newburg at 3,053 ft. and drilled-in to 3,184 ft. where two pays gaged a total of 680,000 cu. ft. natural.

Kansas

Hodgeman County Wildcat Gets Mississippian Show

PROMISING oil showings have been encountered in a remote wildcat test which Trans-Era Petroleum Co. is drilling in northwestern Hodgeman County, in the Hugoton embayment of western Kansas. Showings were in the Mississippian, topped at 4,390 ft. A 2-hour drill-stem test with bottom of the hole at 4,407 ft. recovered 5 ft. of free oil and 160 ft. of heavily oil-cut mud.

The test, 1-B Sinclair, is spotted in the NW NW SE 10-21-26, which is 1½ miles south of the Ness County line. Location is 8 miles south of the Manteno pool of southern Ness County, and 16 miles northwest of the Jetmore pool, Hodgeman County. Showings have been passed up for the time being.

M. B. Armer has a new gas discovery in eastern Pawnee County at his 1 DeRoo, SW SW SE 17-21s-16w. The well flowed at an estimated rate of 4,000,000 to 5,000,000 cu. ft. of gas per day during a 23-minute drill-stem test at 3,803-20 ft. in Arbuckle lime, topped at 3,802 ft. Recovery on the breakdown, however, was 1,050 ft. of sulfur water. Location is 1½ miles north of the Larned townsite and 3 miles northwest of the Larned pool.

About 4½ miles to the east, Nadel & Gussman 1 Bird, NW NW NW 19-21-15, a wildcat located north of the Torrance gas area, flowed at an estimated open-hole rate of 20,300,000 cu. ft. of gas per day from casing perforations at 3,810-16 ft. in Arbuckle lime, topped at 3,809 ft.

Victor Drilling Co. is starting production tests at its 1 Brungardt, a prospective new oil discovery well located ½ mile south of the Ellis townsite and a mile east of the Raynesford pool, in Ellis County. Indicated production is in the Arbuckle, topped at 3,861 ft., and on which casing is bottomed. Total depth is 3,870 ft. A 35-minute drill-stem test of the pay got 1,080 ft. of oil and 240 ft. of muddy oil. Spot location is in the SW NW SW 16-13s-20w.

L. B. Smith and Don Ingling have run casing to test oil showings encountered in their 1 Geil, NE NE SW 29-19s-15w, a wildcat in southwestern Barton County. The well filled 720 ft. with heavily oil and gas-cut mud and 660 ft. of oily water in a 60-minute drill-stem test at 3,633-62 ft. in Arbuckle lime, topped at 3,627 ft. and drilled to 3,685 ft. Location is 1½ miles northeast of the Behrens pool.

KANSAS SUCCESSFUL WILDCAT

Meade County: Columbian Fuel Corp. 1 Adams "K," C SE NE 11-35s-30w, flowed 3,700 M.c.f. of gas from Cherokee at 5,760-70 ft., TD 6,100 ft., PBTD 5,774 ft.

KANSAS WILDCAT FAILURES

Butler County: Butler County Drilling Co. 1 Stewart, NW NE SW 6-29s-5e, dry, TD 2,875 ft.

Cheyenne County: The Texas Co. 1 Walz, SW NW NE 3-5s-42w, dry, TD 5,387 ft.

Clark County: Panoma Corp. 1 Stephens, NE SE NW 22-32s-21w, dry, TD 5,450 ft.

Cowley County: Laura Jane 1 Hammel, CSL SE SW 19-31s-4e, dry, TD 2,965 ft.

Aladdin 1 Tudhope, NW NW SE 11-35s-3e, dry, TD 3,475 ft.

Ellis County: K&E 1 Jensen, NE NE NE 3-13s-18w, dry, TD 3,782 ft.

Ellsworth County: Musgrove 1 Valenta, NE NE SW 7-16s-9w, dry, TD 3,609 ft.

Greenwood County: Imperial 1 Marshall, SE NW SE 25-23s-9e, dry, TD 2,505 ft.

Graham County: Keating 1 Worcester, NW NW NE 12-7s-22w, dry, TD 3,802 ft.

Kingman County: Solar 1 Gibbons, NW NW SE 28-27s-10w, dry, TD 4,435 ft.

Norton County: Empire 1 Atens, SE SE SW 6-1s-22w, dry, TD 3,695 ft.

Osborne County: Anderson-Prichard Oil Corp. 1 Stephenson, NE NE SE 32-7s-15w, dry, TD 3,723 ft.

Rice County: Braden Drilling Co. 1 Edwards, NE NE NE 26-20s-8w, dry, TD 3,308 ft.

Sumner County: E. F. Wakefield et al 1 Messner, NE NE SW 36-33s-1e, dry, TD 3,640 ft.

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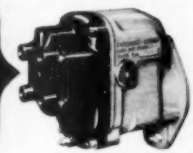

—Switch to Fairbanks-Morse Super Spark Magnetos for your pumping engines. Years of proven service in the oil fields are your assurance of their unexcelled performance and dependability. Don't worry about ignition failure—just start the engine and walk away, confident it will just keep on running day in and day out under the most rugged operating conditions. Super Spark Magnetos have these features built in:

- Compact self-contained unit—simple design—few working parts.
- Oversize, heavy-duty high tension coils.
- Large, "High-Speed" long lasting breaker points.
- Ball bearing supported one piece magnetic rotor.

An explosion-proof Super Spark Magneto is also available.

For dependable engine performance change to Fairbanks-Morse Super Spark Magnetos. See your Fairbanks-Morse service station or distributor or write Fairbanks, Morse & Co., Magneto Division, Beloit, Wisconsin.

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A name worth remembering

MAGNETOS ZC ENGINES MOTORS PUMPS DIESELS

PUMPS

CENTRIFUGAL
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BUILDERS OF OUTSTANDING PUMPS
Since 1869

4085

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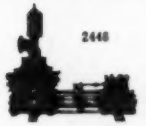
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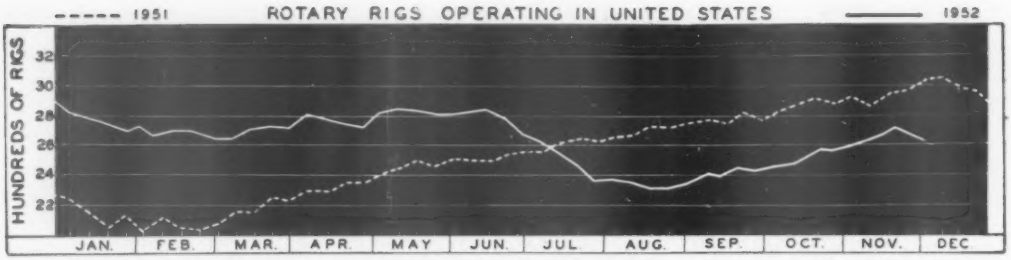
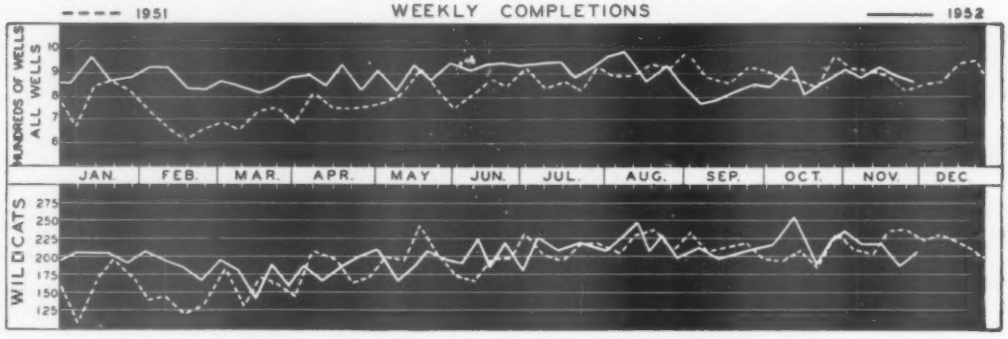
ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.

INDIANAPOLIS IND.

323 W. TENTH ST.





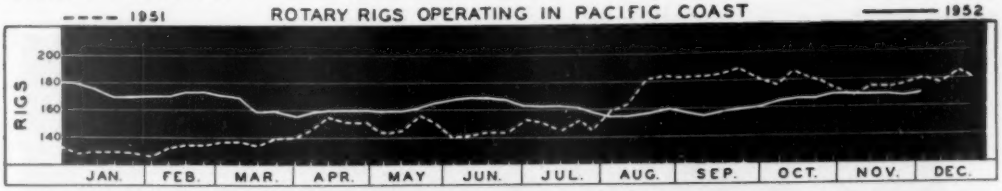
CURRENT STATISTICS

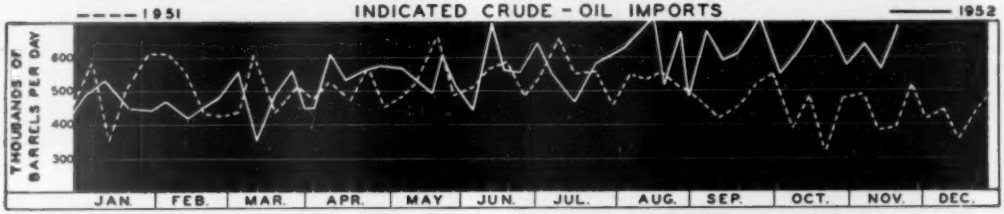
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED NOVEMBER 29, 1952

	Total of all wells					Nov. 29		Wildcat completions and discoveries					Cumulative total, 1952				
	Comp.	Oil	Gas	Dry	Footage	1952	1951	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	14	7	0	*7	22,550	715	593	0	0	0	0	0	0	0	0	2	2
Pennsylvania	39	19	5	†15	86,378	1,830	1,596	0	0	0	0	0	0	0	0	2	2
West Virginia	11	0	8	3	26,799	569	582	0	0	0	0	0	0	0	4	9	13
Ohio	31	11	8	‡12	65,937	937	892	0	0	0	0	0	2	0	8	17	27
Indiana	25	6	0	19	45,901	1,169	1,280	0	0	0	5	5	34	0	3	340	377
Kentucky	24	4	4	16	46,345	1,201	1,204	0	0	0	6	6	24	0	1	247	272
Illinois	52	23	0	29	141,517	1,922	2,272	2	0	0	13	15	26	0	1	526	553
Michigan	9	1	0	8	24,774	652	704	0	0	0	7	7	24	0	5	224	253
Kansas	98	49	5	§44	338,858	4,199	4,074	0	0	1	14	15	90	0	15	685	790
Nebraska	2	0	0	2	9,109	286	216	0	0	0	2	2	12	0	3	157	172
Oklahoma	101	46	5	50	393,329	5,365	5,178	3	0	0	15	18	96	4	12	551	663
Texas	291	165	5	121	1,379,717	15,572	15,301	18	0	1	73	92	727	49	114	3,568	4,458
North Central (Dist. 7-B & 9)	117	55	0	62	389,846	4,972	4,656	6	0	0	38	44	404	2	25	1,458	1,889
West (Dist. 7-C & 8)	73	56	0	17	378,419	4,649	4,638	3	0	0	12	15	157	1	8	655	821
Panhandle (Dist. 10)	4	3	0	1	12,714	593	671	0	0	0	0	0	4	0	8	60	72
Eastern (Dist. 5 & 6)	16	7	4	5	98,895	819	1,096	1	0	0	4	5	20	5	4	217	246
Gulf Coast (Dist. 2 & 3)	44	21	0	23	331,391	2,349	2,120	4	0	0	11	15	70	28	30	523	651
Southwest (Dist. 1 & 4)	37	23	1	13	168,452	2,190	2,120	4	0	1	8	14	72	13	39	655	779
Louisiana	40	24	2	14	234,389	2,166	2,023	0	1	0	4	5	39	18	15	300	372
Northern	22	15	1	6	64,467	1,191	1,118	0	0	0	2	2	16	0	7	158	181
Southern	18	9	1	8	169,922	975	905	0	1	0	2	3	23	18	8	142	191
Arkansas	5	2	0	3	14,141	379	390	0	0	0	1	1	9	0	0	78	87
Mississippi	4	2	0	2	24,815	313	340	1	0	0	0	1	20	2	1	144	167
Southeastern States	1	0	0	1	4,909	66	49	0	0	0	1	1	3	0	1	34	38
Montana	10	3	0	7	31,393	319	229	0	0	0	1	1	9	0	1	81	91
Wyoming	18	7	0	11	92,775	651	682	0	0	0	5	5	21	0	4	132	157
Colorado-Utah	15	4	1	10	84,544	511	280	1	0	1	10	12	20	0	11	234	265
New Mexico	21	7	9	5	121,572	963	656	0	1	0	3	4	36	3	2	102	143
California	38	25	1	12	168,952	2,242	2,132	1	0	0	11	12	66	0	7	469	542
North Dakota	5	2	0	3	40,264	106	9	0	0	0	3	3	5	0	0	28	33
Miscellaneous (Md.)	1	0	0	1	7,162	63	100	0	0	0	1	1	0	0	22	28	50
Total United States	855	407	53	395	3,406,130	42,196	¶40,782	26	2	3	175	206	1,263	76	230	7,958	9,527
Total previous week	893	457	59	377	3,558,415			20	2	4	160	186	1,237	74	227	7,783	9,321
Total December 1, 1951	850	421	55	374	3,352,693			27	1	7	189	224	1,437	73	240	7,795	9,545

Service wells included: *7, †12, ‡2, §3. ¶Revised.

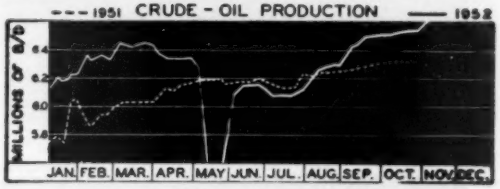


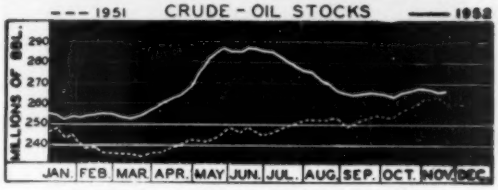


DAILY AVERAGE PRODUCTION FOR WEEK

	November 29, 1952			Nov. 22
	Crude oil	Lease condensate	Total	total
Alabama	3,300		3,300	3,100
Arkansas	75,850	650	76,500	77,700
California	987,300		987,300	986,700
Colorado	89,000		89,000	89,500
Eastern	56,500		56,500	56,500
Florida	1,550		1,550	1,550
Illinois	168,300		168,300	163,900
Indiana	34,200		34,200	33,600
Kansas	348,100		348,100	352,100
Kentucky	31,400		31,400	31,000
Louisiana	648,150	28,900	677,050	677,800
North	110,100	2,350	112,450	113,200
South	538,050	26,550	564,600	564,600
Michigan	39,100		39,100	37,300
Mississippi	91,950	4,050	96,000	95,750
Montana	26,500		26,500	27,000
Nebraska	8,800		8,800	8,500
New Mexico	172,475	450	172,925	173,025
Oklahoma	538,600		538,600	532,900
Texas	3,050,175	44,800	3,094,975	3,094,975
Dist. 1	39,100	250	39,350	39,350
Dist. 2	175,275	4,600	179,875	179,875
Dist. 3	494,975	24,200	519,175	519,175
Dist. 4	276,000	5,300	281,300	281,300
Dist. 5	54,150	250	54,400	54,400
Dist. 6	134,275	4,000	138,275	138,275
East Texas field	256,700		256,700	256,700
Dist. 7-B	118,625	100	118,725	118,725
Dist. 7-C	179,000	5,500	184,500	184,500
Dist. 8	1,049,775	275	1,050,050	1,050,050
Dist. 9	191,650	300	191,950	191,950
Dist. 10	80,650	25	80,675	80,675
Utah	5,400		5,400	5,600
Wyoming	198,000		198,000	195,000
North Dakota	9,500		9,500	9,800
Total U. S.	6,584,150	78,850	6,663,000	6,653,300
Change from previous week, up			9,700	
Canada	203,450		203,450	210,000
Total U. S. production January 1-November 29			2,078,630,425 bbl.	
Same period last year (crude plus cond.)			*2,053,381,850 bbl.	

*Includes 27,289,950 bbl. condensate.



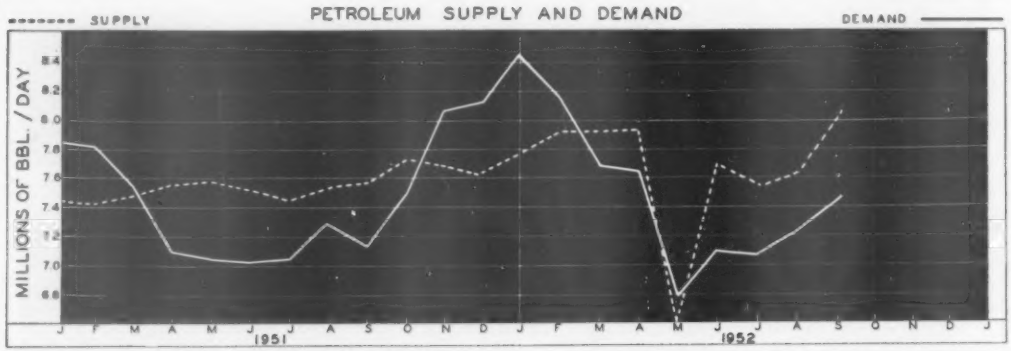


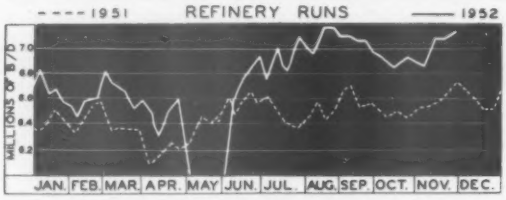
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

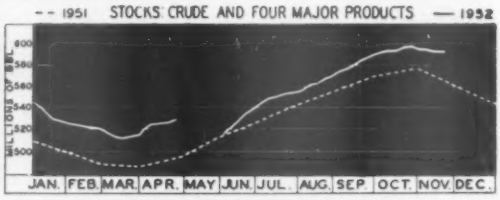
(Thousands of barrels)

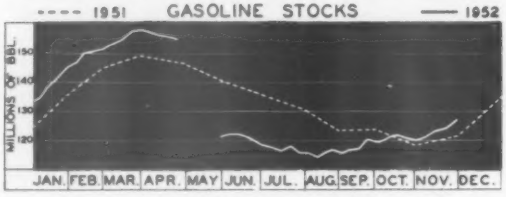
	Nov. 22, '52	Nov. 15, '52	Nov. 24, '51
Pennsylvania Grade	2,268	2,321	1,932
Other Appalachian	1,838	1,843	1,686
Illinois, Indiana, Michigan	12,042	12,190	12,561
Arkansas	3,270	3,077	2,691
Louisiana	15,735	15,859	14,648
North	2,413	2,486	2,811
Gulf	13,322	13,373	11,837
Mississippi	3,072	3,019	3,581
New Mexico	7,140	7,400	7,184
Oklahoma and Kansas	36,845	37,827	40,825
Texas	131,820	130,599	126,131
East Texas proper	12,065	11,946	(†)
West Texas	60,574	59,518	(†)
Texas Gulf	26,430	26,286	(†)
Other Texas	32,751	32,849	(†)
Rocky Mountain	14,619	14,844	14,263
California	30,527	30,302	29,004
Foreign	7,892	7,381	5,959
Total	267,068	266,662	260,465

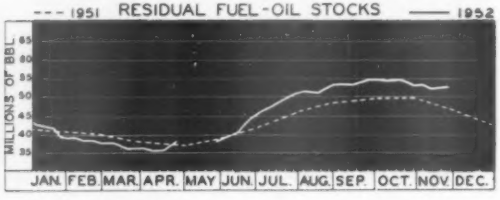
*Bureau of Mines. †Not comparable with current week.











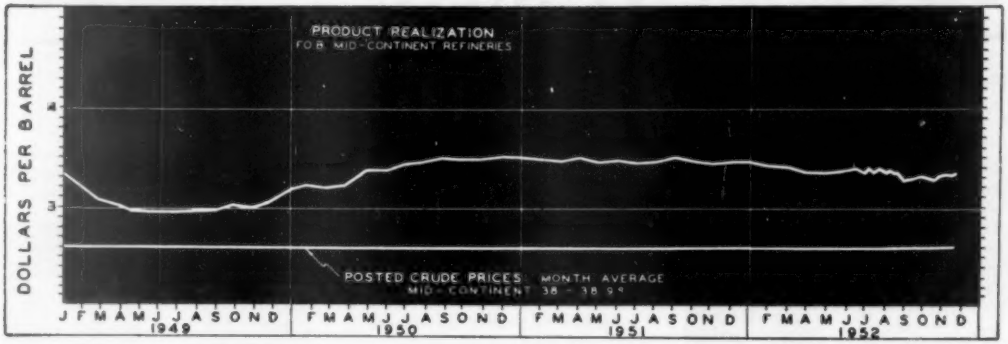
A.P.I. REFINERY REPORT, NOVEMBER 22

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, November 1951 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,061	418.6	40.4	267.3	231.1	30,058	14,398	42,065	11,648	1,022	402.5	46.9	279.8	232.3
Appalachian:														
District 1	108	50.3	8.7	18.3	14.6	3,756	545	1,689	726	103	44.1	5.6	16.4	14.1
District 2	84	41.7	7.3	13.9	13.7	1,621	311	650	350	78	34.1	7.0	9.6	17.8
Ind., Ill., Ky.	1,332	715.6	89.6	237.4	187.4	26,000	6,962	21,974	6,268	1,249	671.9	76.9	219.9	186.0
Okla., Kans., Mo.	585	337.7	13.6	152.4	59.3	12,038	1,982	13,548	1,698	508	285.1	17.5	116.7	65.1
Inland Texas	254	186.9	12.6	37.7	38.0	5,082	447	2,411	1,204	242	164.6	12.0	39.2	39.3
Texas Gulf Coast	1,807	833.7	155.7	486.6	273.9	17,777	3,391	14,641	7,560	1,570	727.6	139.0	347.0	252.3
La. Gulf Coast	537	261.1	76.0	133.4	56.7	6,434	2,587	5,159	1,821	530	232.8	74.3	109.8	59.9
N. La. and Ark.	59	26.6	3.6	8.9	4.4	2,942	687	826	246	80	*34.0	7.7	16.9	7.3
Rocky Mountain:														
New Mexico	17	10.7		2.6	3.6	145		63	76	17	10.2	0.5	2.2	3.7
Other Rocky Mtn.	243	115.7	5.3	42.8	45.4	3,520	424	2,068	1,002	219	105.9	8.8	41.0	47.7
California	989	407.4	8.1	149.7	341.2	14,512	352	12,740	19,482	991	417.0	6.6	159.0	378.2
Nov. 22, 1952	7,076	3,406.0	420.9	1,551.0	1,269.3	123,885	32,086	117,834	52,081	6,609	3,129.8	402.8	1,357.5	1,303.7
Nov. 15, 1952	7,096	3,424.7	353.1	1,556.9	1,235.9	123,313	32,247	119,148	51,942					
Nov. 24, 1951	6,757	3,170.1	408.9	1,346.9	1,329.3	122,105	33,936	105,693	48,704					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.

(Table for November 29 included in News Section)


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
4
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.36 for week ended November 22, $3.34 for previous week, and $3.48 for November 1951. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of December 3, 1952. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅜-10½	12.125-12.75	10¾-11
Premium gasoline, 86-88 octane	11⅜-11½	13.25-14.0	11¾-12
42-44 w.w. kerosine	8¾-9	10.5-10.65	9
No. 2 straw fuel oil	7⅜-8	9.65	8-8.25
No. 6 residual	$0.85-1.00	$2.10-2.20	$1.50-1.65

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6¾	6¾	6¾
Grade 18-55	8.25	7.75	8.0

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	13
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	25-26
200 vis., No. 3 neutral, 0-10 pp.	13-15

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX
Mid-Continent

132-134 A.M.P.	8.5

SOME marketers insist that range-oil and kerosine markets in the Mid-Continent are firmer than No. 2 despite the improved movement of furnace oil from secondary storage in most of the North Central states.

Some of the smaller refiners in the inland areas of Texas are using most of their kerosine output for blending jet fuels. Most of these refiners are normally in the kerosine and range-oil spot markets, and this moderate reduction in availability of these light fuels has resulted in firmer spot prices.

Heavy inventories of No. 2 fuel at pipe-line and river terminals in the North Central states have prevented increases in movement out of Mid-Continent refineries by tank car. Since there are only a small number of points outside the Mid-Continent proper where tank-car shipments from Group 3 refineries can compete with barge or pipe-line rates, it will take some real cold weather to give the needed strength to the Mid-Continent tank-car market for distillate fuels.

A few indicators point to a better residual market in District 2 this winter. The extra availability of natural gas last winter made it possible for some gas companies to serve industrial customers throughout most of the winter. The number of interruptions in gas service for industrial accounts reported in recent weeks indicates that more of these customers will be on heavy fuel this winter.

Higher spot tanker rates on movement of crude and products from the Gulf Coast to East Coast have tended to firm fuel prices at East Coast water points. Dirty vessels on the Gulf-East Coast run are fixed at about 27.5 per cent above the Maritime Commission base. Clean vessels are about MC plus 60 per cent. No. 2 distillate is reported to be unavailable in New York Harbor at prices under the normal posting of 9.65 cents a gallon. Some additional strength is shown by No. 6 fuel.

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	....	....	....
19-19.9	1.98	....	....	....
20-20.9	2.03	$2.25	....	$2.12
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico.

Last general price change represented a 50-cent increase, effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel	
Kettleman Hills, California*	$2.80
Louisiana:	
Beauregard Parish	2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.25
Southwest Pennsylvania	3.82
West Virginia	3.76
Illinois Basin	2.77

*37°-37.9°.

EQUIPMENT MEN . . . in the News

Henson Named Special Sales Representative

W. H. HENSON

William H. Henson has been appointed special sales representative for Norton Co.'s refractories division, according to an announcement by Ralph M. Johnson, vice president in charge of sales. Henson was formerly manager, sales engineering department, of that division.

The company has also announced the reassignment of Charles W. Henson to the refractories sales department to full-time investigation of possible and probable markets for new electric-furnace products developed by Norton's research laboratories before they are ready for general field use.

Microwave Services Is New Telecommunication Firm

The formation of Microwave Services, Inc., has been announced by Sidney K. Wolf, president. The corporation will provide complete engineering services including system analysis, specifications, purchasing, installation, and supervision of plant facilities, and will provide management services in the operation of all types of tele-communication systems. These services will include such varied fields as petroleum, public utility, and telephone.

The corporation will be headed by Dr. S. J. Begun, chairman of the board; S. K. Wolf, president; Emile Labin, vice president; and Victor J. Nexon, vice president and treasurer.

Bovaird Supply Co. Elects Directors

Approaching another important milestone with 82 years' service to the oil industry, Bovaird Supply Co. held its annual stockholders meeting in Tulsa recently. Reelected to the board of directors were: Davis D. Bovaird, president; Frank D. Bovaird, vice president; Roscoe G. Ayers, vice president and sales manager; R. M. McMahan, secretary; R. E. Batchelor, general manager of sales, all of Tulsa, and A. E. Booth of Bradford, Pa.

Founded in 1871 by David Bovaird with its first store at Shamburg, Pa., four generations of the Bovaird family have been actively identified with the company. The fourth generation is represented by W. J. (Bill) Bovaird, son of Davis D. Bovaird.

The company has extended its operations, offices, and stores through the years. The first Mid-Continent branch of the company was established at Independence, Kans., in 1903, and the first Oklahoma store was established at Sapulpa in 1907. Today Bovaird has 22 offices and stores in Oklahoma, Kansas, Illinois, Texas, and its recently established store at Lovington, N. M.

Pipe-Line Division of Perrault Sold to Dixon

The pipe-line equipment and protection business formerly operated by Perrault Brothers in Tulsa has been purchased by W. O. Dixon, former airplane - parts manufacturer of Wichita and Coffeyville, Kans. Under the new ownership the business will be known as Perrault Equipment Co.

W. O. DIXON

SHACKELFORD

Robert E. Shackelford, who was general manager of Perrault Brothers, has been appointed general manager of Perrault Equipment which is wholly owned by Dixon. Perrault Equipment will be operated from the same plant and by the same field, manufacturing, and sales staff, and will continue to make, sell and/or lease Perrault cleaning and priming machines, coating and wrapping machines, tar-heating kettles, and other miscellaneous pipe-line equipment and supplies, and will continue to sell glass pipe wrap, asbestos pipe-line felt, Rock Shield, and kraft-wrap paper. There will be no changes in representation at the Houston and San Francisco offices or in the export office in New York City.

According to Shackelford, there will be moves toward expansion in the equipment business, but such expansion will be entirely within the scope of the pipe-line industry.

Hilker Elected First Vice President of S.A.I.E.

F. C. (Bud) Hilker, public-relations and personnel director of Eastman Oil Well Survey Co., was elected first vice president of the Society of Associated Industrial Editors at the annual convention of the organization recently held in Carlsbad, N. M.

F. C. HILKER

WALTER BEACH

Houston has been selected as the 1953 convention city. The industrial editors will be hosts at a joint convention at that time with the International Council of Industrial Editors of which S.A.I.E. is an affiliate.

Walter Beach, publications director for Humble Oil & Refining Co., is president of I.C.I.E.

Blaw-Knox Chemical Plants Division Promotes Hauck

Chemical Plants Division of Blaw-Knox Construction Co. recently announced the promotion of Charles F. Hauck to assistant sales manager of the division. In addition he will continue his duties as the division's manager of sales promotion.

In his new capacity Hauck will coordinate the sales efforts of the branch offices of the division at New York, Philadelphia, Birmingham, San Francisco, and Pittsburgh. He will also direct the sales efforts of the Chlor-Alkali Department and the Synthetic Fuels, and Low Temperature Processes Departments located in Pittsburgh.

Prior to joining Chemical Plants Division a year ago, Hauck had 15 years' experience in chemical engineering and wet processing industries. He received his B.S. degree from John Carroll University and did graduate work in chemical engineering at Case Institute.

Personnel Changes Named by Mud Products

E. R. Albert, Jr., president and general manager of Mud Products, Inc., has announced the appointment of Roy H. Mitchell as south Oklahoma district manager with headquarters at Ardmore; Chester W. Harper has recently been transferred to Garden City, Kans., as sales representative in charge of that warehouse; Ottis A. Ponder has been named area manager at Duncan, Okla.; and Warren Ashwill, Jr., has been named sales representative at Perry, Okla.

Mitchell was formerly associated with Mud Products' associate company, The Bomud Co., in Great Bend, Kans. Before joining Mud Products' companies, he was with the Ideco Supply Co. in Great Bend. Mitchell's newly appointed territory will include Duncan and Healdton, Okla., areas.

Harper was located at Bomud's Liberal, Kans., stock point prior to his transfer.

Ponder was formerly in the Weed Control Division of Pacific Coast Borax Co.'s Fort Worth offices.

Ashwill, formerly with Stanolind Oil & Gas, only recently returned from a tour of duty with the U. N. forces in Korea.

Diesel Group Names McKinney as President

A. W. McKINNEY

At the annual meeting of the Diesel Engine Manufacturers Association held in New York City in November, the following officers were elected for 1953:

President, A .W. McKinney, executive vice president of The National Supply Co. of Pittsburgh; vice president, Walter A. Rentschler, vice president of Baldwin-Lima-Hamilton Corp. of Philadelphia; vice president, William E. Butts, president of Enterprise Engine & Machinery Co. of San Francisco; treasurer, Robert H. Morse, Jr., president of Fairbanks, Morse & Co. of Chicago, and as secretary and executive director, Harvey T. Hill of Chicago.

The following men, together with the foregoing officers, will serve as directors of the association: William S. Morris, vice president of American Locomotive Co., New York; C. Paul Clark, president of Clark Bros. Co., Olean, N. Y.; Gordon Lefebvre, president of The Cooper-Bessemer Corp., Mt. Vernon, Ohio; George W. Condrington, vice president and general manager of Cleveland Diesel Engine Division of General Motors Corp., Detroit; Harald T. Reishus, general manager of Industrial Power Division, International Harvester Co., Chicago; M. C. Davison, vice president of Ingersoll-Rand Co., New York; Robert E. Friend, president of Nordberg Manufacturing Co., Milwaukee; Otto H. Fischer, president of The Union Diesel Engine Co., Oakland, Calif., and E. J. Schwanhausser, executive vice president of Worthington Corp., Harrison, N. J.

Drilling & Service Names Oliver District Manager

R. D. OLIVER

J. A. BECK

According to a recent announcement by C. Dealy, Drilling & Service, Inc., Dallas, R. D. Oliver has been made district manager in the Mississippi area. He will operate out of Laurel, Miss.

Dealy also announced that Jason A. Beck has recently returned to the United States from an extended trip to the Middle East where he trained drilling personnel in that area in the use of diamonds and diamond drilling.

American Cyanamid Makes Sales Department Changes

Creation of several new posts in the Petroleum Chemicals department of American Cyanamid Co. and consolidation of sales in the department of a wide range of specialty products for the petroleum industry has been announced.

The additional products are for use in drilling, production, transportation, and refining operations and for compounding lubricating greases and oils.

Promoted to new posts in the Petroleum Chemicals department are: R. B. Wainright, technical director with headquarters in New York; V. R. Farlow, eastern regional sales manager with headquarters in the New York sales office; E. F. Heizer, western regional sales manager with headquarters in Chicago; T. O. McDonald, southern district manager with headquarters in Houston; Read Larson, and Charles O. Brown, Jr., sales representatives with headquarters in Chicago.

American Hoist Appoints Bishop General Manager

J. F. BISHOP

Harold O. Washburn, president, American Hoist & Derrick Co., has announced that James F. Bishop has been appointed general manager, in addition to his corporate duties as secretary-treasurer.

A veteran of 30 years' service with American Hoist, Bishop has been secretary-treasurer since 1945, and a member of the board of directors since 1951. He has had wide experience in sales, production, and administration since joining the company in 1923.

Gronauer Named to Key Sales Post by OPW Corp.

R. W. GRONAUER

Appointment of Roy W. Gronauer to assistant general sales manager has been announced by Harry Heinzerling, vice president and director of sales of OPW Corp., Cincinnati, manufacturer of valves, fittings and assemblies for handling hazardous liquids.

Gronauer joined OPW in 1949 as sales engineer. In his new position he will assist the director of sales in the supervision of field representatives, district managers, and will coordinate sales promotion and advertising.

Stottlemyer Promoted To New Division Post

STOTTLEMYER

Robert D. Stottlemyer, division sales manager of The National Supply Co. in its Northwest division, has been appointed assistant division manager. He will have his headquarters at Casper,

Stottlemyer graduated from University of Pittsburgh as a petroleum engineer in 1941. He joined National Supply in August 1946. He served as drilling equipment engineer at Toledo, and later at the company's plant products division, Hous-

ton. He was made division engineer of the Northwest division in 1948, and division sales manager in 1950.

J. W. Gillespie is division manager.

R. L. Shaw Joins Oil Capitol Supply

R. L. SHAW

Tom N. Word, president of Oil Capitol Supply, Tulsa and Borger, has announced the addition of Robert L. Shaw as vice president. Shaw studied petroleum engineering at Tulsa University, and has been connected with the purchasing and sales of general refinery supplies for many years.

In his new capacity Shaw will handle sales work in all areas served by Oil Capitol Supply, and will continue to maintain his present Tulsa headquarters.

Coopman Is Made District Engineer for Marlow Pumps

W. M. Coopman, former division chief engineer for Republic Supply, has been appointed district engineer for Marlow Pumps, Ridgewood, N. J. He will assist Marlow dealers in a newly created territory consisting of southern California, Nevada, Utah, and Arizona, with headquarters in Burbank, Calif.

Previous to his connection with Republic Supply, Coopman was vice president and chief engineer for Cassman Manufacturing in Los Angeles.

James E. Dyer Co. to Represent Hammel-Dahl

J. E. DYER

Hammel - Dahl Co. of Providence, R. I., manufacturers of automatic control equipment, has announced the appointment of James E. Dyer Co. of Tulsa and Oklahoma City, as additional sales and service representative. James E. Dyer, and Leo E. Johns are located in the Tulsa office, and Joe H. Sallee is in charge of the Oklahoma City office.

All three members of the company are engineering graduates and have been associated with the petroleum industry for more than 20 years.

Gardner-Denver Men Discuss Slush-Pump Operations

Gardner-Denver service specialists, who participated in the recent slush-pump round table at Quincy, Ill., were: F. E. Daly, D. E. Kircher, J. G. Smith, R. J. Bauer, O. G. Jansen, N. P. Frazzini, R. G. Rennie, P. M. Young, Wm. Bircumshaw, J. E. Ruyle, R. Scheuring, T. H. France, G. Niehoff, G. J. Schnapka, H T. Schillinger, A. Colman, and R. P. Heckenkamp.

Gardner - Denver staff of oil - field service specialists recently attended a week-long round table discussion on slush-pump operation and trends. Meetings were planned to cover all phases of oil-field installation and repair service, and to demonstrate the latest developments in field maintenance. Classes included welding demonstrations, metal analyses, and discussion on repair parts and their relation to operation of slush and other oil-field pumps.

The meetings, which were held at the Quincy, Ill., plant of the company, were conducted by R. J. Bauer, special oil-field representative from Dallas.

Don E. Kircher, New York export oil-field representative, who recently returned from the Middle East oil fields, represented that division at the meeting. Other service specialists attended the meeting from Dallas, Houston, Wichita Falls, Odessa, and Corpus Christi, Tex., New Orleans, Shreveport, Los Angeles, Oklahoma City, Ellinwood, Kans., Casper, Wyo., Edmonton, Alta., and New York.

Franks Names Rutledge to New York Export Office

Franks Manufacturing Corp., of Tulsa, has announced the appointment of Joe M. Rutledge as assistant export representative in the New York offices of A. V. Simonson, Franks export manager. Rutledge will have offices at 149 Broadway.

Le Roi Integrates Plant And Industrial Departments

Le Roi Co., Milwaukee manufacturer of portable air compressors and internal - combustion engines, has integrated its plant and industrial-engineering departments under the supervision of Wesley A. Schaefer, who will be manager of the new industrial and plant engineering department, Hugh M. Little, works manager at Le Roi's Milwaukee plant has announced.

Walter V. Sovitzky has been named chief industrial engineer in a move to combine Le Roi's industrial and plant engineering departments.

Schaefer has been with Le Roi for 33 years and has been plant engineer since 1929. Sovitzky has been with Le Roi 24 years as shop foreman, methods engineer, and industrial engineer.

Posey-Nutto Is New Tool Company in Casper, Wyo.

W. A. POSEY

W. J. NUTTO

W. A. Posey and W. J. Nutto have announced the Posey-Nutto Tool Co. in Casper, Wyo. The company's office and warehouse is under construction adjacent to W. Yellowstone Road, and the company handles several leading manufacturers' oil-field equipment in the Rocky Mountain area.

Posey has been a driller and tool pusher, a salesman for Reed Roller Bit, and district manager for Security Engineering Co., and owned and operated W. A. Posey Tool Co. before the new company was formed.

Nutto was formerly sales manager for Hunt Tool Co., Houston, and before that was with the Chicago Pneumatic Tool Co.

(Continued on page 182)

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Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

EQUIPMENT FOR SALE

PIPE
All sizes; line pipe and casing, tanks, and Oilfield supplies. Edco Pipe & Supply Co., Phone 45970, P.O. Box 151, Tulsa, Oklahoma.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

FOR SALE: Approximately 200 various sizes rotary drilling subs length 18 to 36 inches—Also various sizes new Hughes and Reed hard and soft formation core bits and catchers for conventional core barrels. 306 Oil & Gas Bldg., Houston, Texas, telephone Blackstone 4342.

FOR SALE: 23,000 ft. of 20" OD used pipe; 5/16" wall; single random lengths; in good condition. Priced very reasonably for quick sale. Contact The Tri-State Pipe Company, Bellaire, Ohio. Phone 42.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 30-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

REFINERY EQUIPMENT FOR SALE
Ready for Shipment

BOILER—360 HP, 350#, single drum boiler, good condition, complete with steel casing and structural supports. Minimum time and cost to put in service.

REACTOR—Heavy wall electric welded ellipsoidal head pressure vessel, 6 foot diameter, 40 foot cylinder. Material .25% carbon steel unlined. Minimum shell thickness 2.4 inches. One end and two side manways. Suitable for reactor, high pressure fractionator or similar use.

These items available for inspection, Mid-Continent location.

GEORGE ARMISTEAD and COMPANY
1200—18th St., N. W., Washington 6, D. C.
REpublic 7-6338

NEW STEEL PIPE

79,000 lin. ft. steel pipe, electric welded 24" diameter, 40 ft. lengths, 930 lb. test pressure, plain ends. Immediate delivery.

MISSISSIPPI VALLEY EQUIPMENT CO.
511 Locust St., Chestnut 4474, St. Louis 1, Mo.

EQUIPMENT FOR SALE

WELL drilling equipment, new or used spudders, rotaries, core & shot hole drills tools, pipe, bits, blocks, pump jacks, valves Everything for well drilling and service Fishing tools rented. Pressey & Son, Pueblo Colo

FOR SALE at Oklahoma City a large quantity of 3", 4" and 6" line pipe couplings and 7" 17# casing couplings. Contact T. P. Mace there or write Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE: Sullivan "300-A" drilling rig complete with 2-Buda engines, one practically new, drawworks, rotary table, 65' derrick with 20' section to pull doubles; Whestley 7x10 mud pump, swivel, traveling block, kelly, etc. All mounted on tandem trailer. Excellent rig for drilling to 3000' or deep core drilling. Rig in excellent condition. Selling to replace with larger equipment for deeper drilling. Contact Box 1022, or Phone 813, Del Rio, Texas, for inventory and price.

FOR SALE
MODEL 1050 IDECO RIG
Powered With
Three G-M Twin Diesels

136 Ft. Lee C. Moore, Heavy,

Wide-Base Mast

4½" Grade E Drill Pipe with Hard Bands Drilled Four Gulf Coast Wells.

Rig is Complete and in Good Condition

Write Box G-166, The Oil and Gas Journal, Tulsa, Oklahoma

EQUIPMENT FOR SALE

2 FAILING Model 1500 drills, shop number 966 mounted on KBS-7 1947 International truck, shop number 909, of special design mounted on GMC 6 x 6. Both drills in good condition and reasonably priced. Write for prices and list of equipment. Box G-193, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 40,000 ft. #1 3½" O.D. standard plain end line $0.55 per ft. 20,000 ft. 4" O.D. flues. Rogers Pipe and Supply Company, Phone 5-8850, Tulsa, Oklahoma.

FOR SALE—PRIME TUBING

3" O.D. X .095 Wall X 15-ft. lengths. C.R. EW-Prime-Press Test 4000# PSI. 40,000 Ft.

Immediate Delivery From Our Plant Below Mill Price

WALLACK BROS.
7400 S. Damen Ave. Chicago 36, Ill.

HUMBLE TYPE

1¼" PRESSURE and TEMPERATURE RECORDERS

2⅝" DRILL - STEM PRESSURE RECORDERS

OIL FIELD RESERVOIR ANALYSIS EQUIPMENT

ENGINEERING PRODUCTS INC.

(Successors to Engineering Laboratories, Inc. BHP Division)
600 E. 4th St. Phone 2-7223
Tulsa 3, Oklahoma

55,000 BARREL TANKS

5—55,000 bbl. steel cone roof tanks, 114' 6" dia. x 30' high, riveted construction, used, good condition; location Kings Mills, Texas, will furnish specifications, price, upon request. (Prompt delivery).

MID STATES PIPE AND SUPPLY COMPANY
P.O.B. 2534,
Tulsa, Oklahoma Ph. 2-9128

ROGERS & WRIGHT, INC.
216 W. 2nd Street,
Tulsa, Oklahoma. Ph. 5-3229

DRILLING EQUIPMENT FOR SALE

Emsco EC Drawworks with hydromatic brake, two automatic catheads.
Emsco J-1250 compound transmission for three engine drive, with pump takeoff pulley, equipped with 24" Fawick clutch; air compressor mounted on compound case.
5—Cummins Diesel Engines, Model LP 600, each with 18" double Twin Disc clutch.
2—Emsco Type JA reverse gears.
1—National Rotary 3 speed gear box, equipped with 18" Twin Disc clutch.
1—Steel skid base for three engines, 18" high.
1—Steel base for Emsco Reverse Gear.
Equipment may be inspected at our yard at 3465 Cherry Avenue, Long Beach, Calif.

THOMAS P. PIKE DRILLING CO.
417 South Hill Street Los Angeles 13, California

EQUIPMENT FOR SALE

BUCYRUS ERIE 36-L Spudder complete, excellent condition, Serial #4432? with L.O.-525 Buda natural gas-gasoline engine. Also Used Casing & Tubing. The Sandy Supply Co., P.O. Box 123, Wooster, Ohio.

1 MODEL 1550-C, 2½X5X10, Gaso Pump. Complete with Mission Valves & Pistons. Ready for use. Will sell for $1,750.00 (½ of New Price). 1 International 450 Red Diamond Engine, complete with Radiator, Clutch & Transmission. Total time on Engine 5 hours. Will sell at sacrifice. Delivered price $1,000.00. Write or Phone 2170. Producers Chemical Service, 1404 S. Cedar, Borger, Texas.

FOR SALE: 1—Super D Spudder, powered with 100 h o s e International engine. Equipped for Butane, all tools complete, from 18" on down. This rig is now on location near Fruita, Colorado. Price $9000. Send all inquiries to: Mr. R. Mitchell, Room 206, Claypool Hotel, Indianapolis, Indiana.

FOR SALE: One 4'0" ID x 40'6" x 11/16" shell Tower, Hastalloy lined, no trays, 250# WP for vertical erection. Price $1,500.00. Kinslow Power & Equipment Co., 817 So. Boulder, Tulsa 14, Okla.

OIL WELL CASING, TUBING, DRILL PIPE AND LINE PIPE. Brand New, Mill Reconditioned and A-1 Used Oil Country Tubular Goods available in any quantities required by end-users and not for resale. GAS CORPORATION, 333 N. Michigan Ave., Chicago 1, Ill.

FOR SALE: R. L. Dubbledrum Cardwell fully equipped. Oklahoma City. Melrose 8-9234.

FOR SALE: Standard rig—complete with tools, in good condition. Just finished Oriskany well located in Washington County, Ohio. M. N. Judson, Rural Valley, Pa. Phone: Rural Valley 3-311.

FOR SALE

175 KW Generator Packaged Unit, mounted on Skids, consisting of:

1 Set Model 12201 General Motors Twin Diesel Engine with mufflers and filters.

175 KW General Electric Generator, Volt 220/440, Frequency 250 KVA, Phase 3.

1 Control Panel attached Unit in perfect condition. Located in Casper, Wyoming.

AMERICAN PIPE & SUPPLY CO.
Casper, Wyoming
Box 1689 **Phone 447**

FOR SALE
USED REFINERY EQUIPMENT
LOCATED IN MICHIGAN

(3)—2355 Sq. Ft. Vapor Condensers, 125 PSIG.
(2)—1485 Sq. Ft. Vacuum Condensers, 125 PSIG.
(3)—720 Sq. Ft. Condensers, 125 PSIG.
(2)—258 Sq. Ft. Condensers, 125 PSIG.
(2)—440 Sq. Ft. Condensers, 75 PSIG.
(1)—470 Sq. Ft. Exchanger, 250 PSIG.
(2)—1634 Sq. Ft. Exchangers, 150 PSIG.
(1)—394 Sq. Ft. Exchanger, 125 PSIG.
(2)—275 Sq. Ft. Coolers, 125 PSIG.
(1)—819 Sq. Ft. Cooler, 60 PSIG.
(1)—550 Sq. Ft. Cooler, 75 PSIG.
(2)—225 Sq. Ft. Heaters, 125 PSIG.
(1)—Vacuum Flash Tower: Top section contains 5 trays on 27" spacing. I.D. is 9 feet. Bottom section contains 5 trays on 27" spacing. I.D. is 6 ft. (11)—18" Manways on ¼" thick shell.
(1)—5' X 17' Sulphur Tank: ⅜" Shell and Dished Heads.
(1)—4' X 12' Distillate Receiver Tank: ⅜" Shell and ½" Dished Heads.
(1)—5000 gal. Emulsifier Pressure Tank, 100 Lbs. complete with coils.
Pumps—Various Capacity and Sizes.

Box G-184
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR SALE: 1600 feet 7" 20# and 800 feet 8⅝" 24# good used casing. Will sacrifice. Located Central Pennsylvania. Box G-195, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 6 (six) Type 80 Cooper Twin Compressors. Good Condition. Alfred B. Kern, 223 Wright Bldg., Tulsa, Oklahoma.

"OILWELL" GAS BOOSTER UNIT

Practically brand new. Used less than one week. Purchased direct from Oil Well Supply Company. Unit ES-341-51 complete with Waukesha Model 6-NKU, 130 HP; 6 cylinder power unit, specially equipped for gas compressor drive. 30 pound intake and 125 pound discharge. Rated 1,500,000 cubic feet per day at 240 rpm. Also equipped with automatic unloading assembly; miscellaneous pipe, valves and fittings. Priced for prompt sale. Contact Everett E. Knott—Texas Lightweight Aggregate Company, 400 First National Bank Bldg., Dallas, Texas.

FOR SALE: Walker-Neer Spudder S-32 Special, complete with tailing-in tools for 5" and 7" casing. Lines extra good. Dog House, light plant, float trailer. Complete tools for drilling, running tubing, sucker rods, etc. Butane equipped. Price $15,000.00. For inventory write Box 1022, Del Rio, Texas.

CLEVELAND Models 75, 95 & 110 Ditchers Available—Rental to apply on purchase. A. C. R. Co., 19615 Nottingham Rd., Cleveland 10, Ohio. KEnmore 1-8000.

FOR SALE: Mathey Gas Testing Unit Complete, Mounted in 1948 Chevrolet Aero Sedan. A-1 Condition. Located District Office 2 Miles East of Seminole, Oklahoma. Submit Bids to Deep Rock Oil Corporation, Box 1051, Tulsa, Oklahoma, Attn: Purchasing Department.

FOR SALE: 10,000 ft. 16" OD ¼" wall E. W. Range 3 beveled New Pipe; 10,000 ft. 7" OD 26# R-2 10V thread Seamless Casing; 5,000 ft. 7" OD 24# R-2 10V thread Seamless Casing; 10,000 ft. 5½" OD 14# R-2 8R thread Seamless Casing; 10,000 ft. 7" OD 24# 10V thread Lapweld Casing; 5,000 ft. 5½" OD 17# 8-R thread Lapweld Casing; 10,000 ft. 6⅝" OD Standard Line Pipe P.E. or T&C; also quantities of Miscellaneous Casing, Tubing and Line Pipe. Phone, wire or write Sabine Pipe & Supply Company, Phones 3094, 3095, 5533, 3436, Kilgore, Texas.

GASOLINE PLANT FOR SALE

Buildings, E n g i n e s, Compressors, Electric Generators, Electric Motors, Pumps, Boilers, Tanks, and Pressure Vessels.

Plant located near Seminole, Okla.

SINGER SUPPLY CO.
Box 755 **Tulsa, Oklahoma**

SURPLUS
SHOP EQUIPMENT
FOR SALE

1 Lodge & Shipley Hollow Lathe 8⅛" hole, 25" x 16' Motor Driven. Purchased new in 1950.
1 Seneca Falls Engine Lathe 12" swing x 6' bed. Motor Driven Thru Turner Unit.
1 Bridgeport 8" Hole Hollow Spindle Lathe. 8" Swing, 16' bed. Motor Driven Thru Turner Drive.
1 Smalley General Thread Miller, 2 Motor Driven.
1 15" R. A. Kelly Co. Shaper Motor Driven thru transmission.
1 21" Champion Post Type Drill Press, Motor Driven.
1 400 AMP Lincoln Electric Welder. 220 Volt, 60 Cycle, 3p Motor Driven.
1 Kalamazo P45 Band Saw. Motor Drvn.
1 Buffalo 14" Post Type Drill Press. Motor Driven.
1 200 Ton Hydraulic Horz. press. 10' inside clearance. Motor driven pump.
This is only partial inventory of available machine & engine shop equipment. Located at our Abilene Branch.

Phone—Wire—Write

EMPIRE MACHINERY COMPANY
Box 4028 **Box 1978**
Odessa, Texas **Abilene, Texas**

EQUIPMENT FOR SALE

OIL Field Casing, New 5½" and 7" German casing from Houston storage. Immediate delivery. P.O. Box 929, Houston, Texas

ONE Cardwell H.S. and one Franks S.E.T. single drum servicing units, mounted on IHC trucks with 65' telescoping masts. Phone 80, Stafford, Kansas.

1 Oilwell Steam Pump, 16⅛ x 7⅝ x 20" 1 Gardner-Denver Steam Pump, 18 x 8 x 20" Both pumps are in excellent condition, may be seen at Makin Drilling Company Yard, Hobbs, New Mexico. MAKIN DRILLING COMPANY, Box 1628, Hobbs, New Mexico.

DRESSER COUPLINGS — For sale, 1,000 pcs. 6⅝" OD Line, complete with bolts and gaskets, largest portion never in use, excellent condition. JULIUS M. FOGELMAN, 1649 Perkiomen Ave., Reading, Penna.

GAS METERS FOR SALE. Westcott, Foxboro and Emco. Good condition. Geo. R. Milner, Box 124, Okmulgee, Oklahoma.

FOR SALE: 30 miles 6⅝" OD seamless 18.97 weight, 40 ft. joints, cleaned and beveled for welding, used pipe, clean inside, located Tulsa vicinity. 20 miles 4½" OD seamless, weight 9.50, Range 1 T&C, new foreign pipe, located Houston, Texas. 15 miles 3½" OD, seamless, weight 6.50, Range 1 T&C, new foreign pipe, located Houston, Texas. W. C. Berry, P.O. Box 1858, Tulsa, Oklahoma. Phone 3-6141.

GASOLINE & Gas Generator Sets Complete: 1—8 Cyl. 136 Kw Type T, each $1,980.00. 2—6 Cyl. 100 Kw Type T, each $1,720.00. 2—4 Cyl. 68 Kw Type T, each $1,200.00. 1—3 Cyl. 72 Kw Type T, each $1,350.00. The above are all Foos Gas Engine Co. make and have been used only for standby service and none have been used more than 100 hours and are like New, complete Electrical Units used separately, with Switchboard, Regulators, Rheostats, and Electric Starting Units, 3 Ph., 60 Cyl., 240 V. 720 RPM. Located New England. 1—125 HP IHC, with 75 Kv. Generator, 3 Ph., 60 Cyl., 220 V. Gas or Gasoline with Clutch, $1,000.00. 1—Ames 3 Cyl. Steam Eng. with 175 KVA complete, $3,850.00. We have all kinds of Good Used Construction Equipment. Tell us what you want to Buy or Sell. The T. J. Lane Co., Box 665, Springfield, Ohio.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

WILL BUY late model used 7¼ x 16 or 7¼ x 18 mud pump. R. Olsen Oil Co., 2811 Liberty Bank Bldg., Oklahoma City, Okla.

WANTED: Used Spudder with tools. Send complete details. M. J. Schroeder, Matamoros 1236, Pte. Monterrey, Mexico.

WANTED: Three engine compound for Wilson Titan drawworks. Makin Drilling Company, Box 1628, Phone 3-3141, Hobbs, New Mexico.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

500 to 1000 feet of 2⅞" I.F. Rge. 2 drill pipe. Must be good. Box G-197, The Oil and Gas Journal, Tulsa, Oklahoma.

ROTARY rig in the 2000-3000 foot class, preferably portable. Must be in first class condition. Give all particulars in first letter. Box G-198, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Oil Well Casing, Tubing, Drill Pipe and Line Pipe, new, reconditioned and A-1 Used. Give complete description, price and location. GAS CORPORATION, 333 N. Michigan Ave., Chicago, Ill.

WANTED: Used sucker rods, ¾ and ⅞", used tubing, casing and steel or plastic line pipe and bolted storage tanks. Any amounts. Goodall Electric Mfg. Company, Ogallala, Nebraska.

EQUIPMENT WANTED

WANTED: Used Lee C. Moore 98-ft. mast, 9-ft. substructure. Box G-214, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale? Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

HELP WANTED

OIL SECRETARY: Age 35 to 45, for independent oil company in Oklahoma City. Must be expert stenographer, well experienced in oil production and operations. Must have excellent character and references. Sal. $350 per mo. with raises commensurate with ability. P.O. Box 1824, Oklahoma City, Okla.

WANTED: Man experienced in operation of catalytic cracker for position as assistant superintendent. In replying please state age, qualifications and experience. All inquiries will be held in strictest confidence. Box G-209, The Oil and Gas Journal, Tulsa, Oklahoma.

ASPHALT: Want man with industrial application or refinery experience, preferably both, on asphalts and their processing methods. Send complete resume and salary requirements (confidential). Salary open and commensurate with ability. Box G-210, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL Engineer - Chemical Engineer. Opportunity for each in a petroleum refinery located in Mid-Continent area. Prefer men with three or more years of experience. In first letter give a resume of training and experience. Replies confidential. Box G-211, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Industry vacancies for drilling, production and reservoir engineers, office and field geologists, process engineers and refinery operations supts. Also need experienced draftsmen and cartographers. Write Professional Placement Service, 516 University Bldg., Denver, Colo.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

WANTED: Experienced refinery operators, willing to travel, college education advantageous but not required. Reply to Box G-207, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Seismologists and Seismic Computers by large, well established geophysical company. Give full details of education and experience in letter. Box G-176, The Oil and Gas Journal, Tulsa, Oklahoma.

ESTABLISHED plastic pipe distributor desires salesmen for Oklahoma and Texas. Product to be handled as sideline. Substantial commission allowed. Give territory covered in reply. Box G-219, The Oil and Gas Journal, Tulsa, Oklahoma.

PROGRESSIVE well financed closely held company desires individual experienced in development and direction of exploratory drilling and production, interest and salary basis. Box G-218, The Oil and Gas Journal, Tulsa, Oklahoma.

WELL-DRILL SALESMAN

Need man experienced in selling drilling rigs to oil and gas industry. Leading equipment distributor has opening for go-getter acquainted in Western Pennsylvania oil and gas fields to specialize in well drill sales. Salary, new car and expenses. Write giving all personal and business background; snapshot desirable. Reply to

H. A. CAMERON
General Sales Manager, Beckwith Machinery Company
6550 Hamilton Ave., Pittsburgh 6, Pa.

HELP WANTED

SEISMIC PERSONNEL needed for United States and Canada by well known and expanding contract geophysical company. Address Box E-863, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

PURCHASING AGENT for large, well established geophysical company. Must be familiar with all phases of seismograph purchasing. All replies confidential. Box G-201, The Oil and Gas Journal, Tulsa, Oklahoma.

GAS ENGINEER
Independent Oil Company with oil and gas properties in New Mexico and West Texas has opening for field gas engineer in its organization. Background in gas production, transmission and compression required. This is an excellent opportunity for a young man with an engineering degree and field experience to grow with an organization. Write resume giving details of education and experience. Enclose small photograph if possible. Box G-199, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

GEOLOGIST: age 36, fourteen years diversified major and independent company experience in Texas and Louisiana Gulf Coast, West Texas-New Mexico, Colorado-Nebraska. Desire connection with active independent. Excellent references. Box G-200, The Oil and Gas Journal, Tulsa, Okla.

DRILLING Supt. or Tool Pusher. Experienced in Rocky Mt., Mid-Cont. and Gulf coast, 4 years executive experience, qualified diesel engineer, want work with aggressive independent or contractor. Further information furnished on request. Box G-204, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1629. Ph. No. 3-3141, Hobbs, New Mexico.

PRODUCTION man 24 years' experience wants lease job. Can operate cleaning out and pulling machines. Box G-212, The Oil and Gas Journal, Tulsa, Oklahoma.

WASHINGTON REPRESENTATION

Trade association lawyer, age 45, desires change of affiliation as industry or trade group executive in Washington. Wide experience in legislative field, appearances before Congressional committees, labor relations, management counselling, public relations and general association activities. Top-notch references.

ROBERT E. WILLIAMS
P.O. Box 5682, Washington 16, D. C.

LEASE AND DRILLING BLOCKS

AN OPPORTUNITY TO GET IN ON THE GROUND FLOOR OF THE PLAY IN SOUTH DAKOTA

Will sell acreage and/or land owners royalty in 2,000,000 acre area slated for a minimum of four drill tests in 1953. Minimum sale: 10 acres at $5 per acre. Can offer any size block with seismograph work and geological data furnished. Will drill on turnkey basis.

CLYDE WILSON EXPLORATION CO.
Box 100, Kranzburg, South Dakota

SITUATIONS WANTED

REFINERY SUPERINTENDENT—or General Manager (Might be interested in position as Asst., Supt. or travelling operator). Experience extends through operation, construction and maintenance. Have helped build and/or start up five new refineries. Have had some foreign service. Will go anywhere in the world. Box G-213, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL SCOUT OR LAND CONTACT position desired Williston Basin or Latin America. 4 years' experience sales promotion, market research, public relations, heavy machinery and oil company marketing Montana and East Coast. A. B. Finance and International Law, Eastern University. Speak Spanish and Portuguese. Age 28, single. F. A. Martin, 1216 N. 31st, Billings, Montana.

GEOLOGIST with Ph.D. and varied experience. Desires domestic or overseas position with consulting contracting firm or smaller company. Box G-187, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column? Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

CAPITAL needed, this year or next, to develop several good prospects, farm-outs, and leases, selected by oil geologist. Box G-217, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 40 acres, 7½ miles north Poplar, Montana, Williston Basin. Oil rights optional. George Denny, Ft. Washakie, Wyoming.

FOR SALE: Oil and gas leases in Sherman Co., Kansas. 1600 acres in one block and 320 acres in Banner Co., Nebraska. Box G-216, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1000 acres State Leases in Guadalupe and Hidalgo and McKinley County, New Mexico. Box G-215, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL sell ¼ interest in test well proven Red Fork Area, Creek County, Oklahoma. Not Promotion deal. Bank References given and required. 1211 E. 32nd, Tulsa, Okla. Phone 7-5155.

IF you have the money and want to develop a salt dome under the Sarah Welding survey in West San Augustine County, Texas, write R. B. Whitton, Route 1, Chireno, Texas.

1500 ACRES in South Bryan County near Red River for a test. T. H. Knight, Colbert, Oklahoma.

INDEPENDENT oil company desirous of acquiring additional oil reserves, preferably in Texas. Daily production up to 200 barrels will be considered. Write Rose Lee Oil Corporation, 913 Brown Building, Austin, Texas. Phone 8-9498.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
6835 Delmar Ave., St. Louis 5, Mo.

LEASE AND DRILLING BLOCKS

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O Box 2183, Denver Colorado.

SEE A. L. BOWLES, Ada, Oklahoma, for attractive drilling deals.

ACREAGE FOR SALE: Nebraska Salina Basin Test. Drilling soon. Offset $25., ½ mile $15., balance $5. per acre. Excellent Geology. Write or call J. K. Walker, W & M Oil Co., 116 So. 15th, Lincoln, Nebraska.

FOR SALE: Bargain — 50,000-acre lease. Joins major company's producing lease. Also three miles from large oil field. Address W. B. Kyle, 1006 Dallas Avenue, Houston, Texas.

LEASE and well drilled in 100 bbl. per hour vicinity. $300.00 per 1/32. Money escrowed until sand is drilled. L. Price, Coweta, Okla.

ACREAGE: New South Dakota wildcat, good geology, title work completed, portion landowner royalty for sale. Four wells to be drilled in 1953. For full details, write Box 822, Watertown, South Dakota.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

ROYALTIES

WILLISTON BASIN ROYALTIES
Dealers in Montana royalties since 1921 now specialize in royalties under major company leases in the Montana portion of the Williston Basin. For information on our method of operation, write LANDOWNERS ROYALTIES COMPANY Box 1225 Great Falls Montana

JACK EAGLE—Pay you immediately for your producing royalties and Overrides, absolutely no delay, send complete details 706 City Nat'l Bldg., Okla. City, Okla. REgent 6-7027

WILL purchase production, producing royalties or other good investments. Northwestern Oil Company, 1739 Curtis, Denver, Colorado.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column use a Journal classified advertisement to find it. See box heading for classified rates or write The Oil and Gas Journal.

PRODUCTION FOR SALE

FORCED to sell two wells on forty acres. Several undrilled locations Redfork sand. Electric equipment. P. O. Box 26, Tulsa, Oklahoma.

INCORPORATIONS

DELAWARE CORPORATIONS FORMED & SERVICED. Commonwealth Trust Co. P.O. Box 350, Wilmington, Delaware.

BUSINESS OPPORTUNITIES

FOR SALE—Well established Fuel Oil business and Lubricating Plant; half million gallons storage; located in the State of Missouri. Box G-208, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION WANTED

WE WILL BUY
Producing Properties—Any Size

WE WANT
Geologically Sound Drilling Deals
Deal Directly With Us
as principals

BOX G-186
THE OIL AND GAS JOURNAL
TULSA, OKLAHOMA

RANCHES AND FARM LANDS

RANCH EAST COLORADO 6534 Acres. Improved and fenced grass land 2½ mi. out. $115,000. Terms. Possession. Has Oil Possibilities not leased. E. H. Grantham, Broker, ORDWAY, COLO.

REWARD OFFERED

STOLEN!!! New christmas tree valve from Central Pennsylvania. 10,000# test Serial No. 51-52-10-1044. Manufactured by Oil Center Tool Company. $500.00 reward information. Box G-124, The Oil and Gas Journal, Tulsa, Oklahoma.

SERVICES

GEOLOGICAL Consultant of Central and Eastern Oklahoma has Employed Top Caliber Geologists and Draftsmen for Compilation, Interpretation of Geological Data, Subsurface Structural Mapping and Preliminary Reservoir Appraisals. THIS SERVICE OFFERED TO OIL COMPANIES. P.O. Box 1884, Tulsa, Oklahoma.

REAL ESTATE

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

COMPLETION SERVICE

FOR Difficult Well Completions in the Denver Basin or Rocky Mts. Phone Alpine 7090 Denver, Colo. PETROLEUM ASSISTANCE CO. (PASCO) (Registered Engineers) 701 Midland Savings Bldg., Denver 2, Colorado.

INSURANCE

ATTENTION Drilling Contractors: Complete blowout, crater, submersible, water, fire, public liability, and bodily injury insurance. Complete program can be arranged through your bank. Write Box 100, Kranzburg, South Dakota.

EQUIPMENT MEN

(Continued from page 178)

Mead Elected Assistant Vice President of Ryerson

J. M. MEAD

At the quarterly meeting of the board of directors of Joseph T. Ryerson & Son, Inc., James M. Mead was elected vice president, according to an announcement by Edward L. Ryerson, chairman, and Charles L. Hardy, president. Mead managed the New York steel service plant of the company from 1946 until this year when he was appointed first assistant to Ainslie Y. Sawyer, vice president in charge of purchasing, procurement, and merchandising, with headquarters in Chicago.

He has spent his entire business life with Ryerson, beginning at New York in 1919. Following a long period of sales work he served as assistant plant manager at Philadelphia and was made manager of that plant in 1941.

Visco Products Names Personnel Promotions

D. M. JACKS

C. F. Spangler, vice president of Visco Products Co., Houston, has announced the following company promotions: D. M. Jacks has been promoted to the office of assistant vice president as of November 1; Dr. W. H. Kirkpatrick, formerly chief chemist and plant manager of Visco, has been promoted to the office of assistant vice president as of November 1, and Fred E. Cochran, formerly manager of the Mid-Continent Division, was advanced the first of this year to the newly created position of general field manager.

KIRKPATRICK

F. E. COCHRAN

Jacks joined Visco in October 1937 as a junior salesman in the Houston territory. A short time later he was made district manager of the southern Louisiana area with headquarters in Lake Charles. In July 1943 he was named sales manager with headquarters in Houston. Jacks will continue to operate in the capacity of sales manager with increased responsibilities.

Dr. Kirkpatrick became affiliated with Visco in July 1937 as chief chemist and plant manager with headquarters in Sugar Land, Tex. Prior to that time he was associated with National Aluminate Corp., Chicago. In his new position Dr. Kirkpatrick will operate in the capacity of technical director in charge of research, development, and manufacturing.

Cochran has been connected with the oil-producing industry since 1934. He worked for oil companies in the United States and in Colombia, South America, for 8 years. Cochran joined Visco in September 1946 as a junior salesman in Oklahoma, and was made district manager in charge of that area 8 months later. He was promoted to manager of the Mid-Continent division in September 1947, and to general field manager in January of this year.

Central Area

(Continued from page 170)

Clay County: C. E. Brehm and V. J. Nolan 1 Traub et al, NW SW NW 12-5n-6e, dry, TD 2,892 ft.

Calvert Drilling, Inc., 1 Kincaid, NE NW NE 33-4n-6e, dry, TD 3,017 ft.

Clinton County: A. Schiermann et al 1 Colcord, NE SE NW 12-1n-3w, dry, TD 1,089 ft.

Crawford County: Newman Drilling Co. 1 McGahey, SW SE NE 9-6n-11w, dry, TD 951 ft.

Cumberland County: A. J. Slagter 1 Layton, SE SE SE 20-10n-8e, dry, TD 3,900 ft.

Madison County: W. C. Grossman 1 Dobrinch, E½ SE NE SE 8-5n-6w, dry, TD 615 ft.

Montgomery County: California Co. 1 Schmidt, NW SE SW 11-8n-5w, dry, TD 2,269 ft.

Saline County: W. C. McBride, Inc., 1 Beverly, NE NE NW 13-9s-7e, dry, TD 2,630 ft.

Wayne County: Superior Oil Co. 1 Bauer, SW NW SE 7-2s-6e, dry, TD 3,304 ft.

George & Wrather 1 Feather, NW NW NE 35-1s-5e, dry, TD 3,135 ft.

White County: C. E. Brehm and V. J. Nolan 1 Ward, SE SE SE 19-5s-9e, dry, 3,342 ft.

V. R. Gallagher 1 Stinson, SW SW NW 23-7s-10e, dry, TD 2,167 ft.

INDIANA WILDCAT FAILURES

Clark County: Russ Oil & Mineral Co. 1 Garriott, Military Grant 53-1s-7e, dry, TD 1,550 ft.

Gibson County: Morris Drilling Co. 1 Ford, Military Donation 90-1s-10w, dry, TD 1,863 ft.

Sullivan County: Boyd-Brown 1 Parker-Day, location 245-6n-9w, dry, TD 1,468 ft.

G. Lowery and J. E. Bauer 1 Scott, NE NW SE 18-9n-10w, dry, TD 2,520 ft.

F. Runyon 1 Hickory Grove, NW NW SE NW 28-8n-8w, dry, TD 1,395 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Christian County: National Associated Petroleum Co. 1 Cook, NW NW SE NW 13-H-26, dry, TD 1,629 ft.

Daviess County: Hoosier Drilling Co. et al 1 Lashbrook, W½ NE NW NE 9-N-30, dry, TD 1,126 ft.

Edesto Mining Co. 1 Roberts, NW NW NE NW 20-Q-31, dry, TD 1,510 ft.

E. F. Moran 1 Miller, SE SE NW NE 12-N-29, dry, TD 1,900 ft.

Henderson County: J. C. Ellis and George Hoffman 1 Barrett, NW SW NE SW 17-Q-24, dry, TD 2,538 ft.

Hopkins County: National Associated Petroleum Co. 1 Rice, NW SW SW SW 16-K-23, dry, TD 2,817 ft.

MICHIGAN WILDCAT FAILURES

Hillsdale County, Somerset Township: Allied Investment, Inc. 1 Crabtree-Thomas, NW SW SW 9-5s-1w, Traverse 1,490 ft., dry, TD 1,497 ft.

Ionia County, Lyons Township: Fisher-McCall Oil & Gas, Inc. 1 Consumers Power Co., NW NW SW 28-7n-5w, Dundee 2,771 ft., dry, TD 2,850 ft.

Jackson County, Hanover Township: Allied Investment, Inc. 1 Maitland, NW SW NW 25-4s-2w, Dundee 1,694 ft., dry, TD 1,770 ft.

Kent County, Gaines Township: Granville C. Berlin 1 Martin, SW SW NE 28-5n-11w, dry, TD 1,775 ft.

Mecosta County, Martiny Township: Rex Oil & Gas Co. 1 Bouch et al, N½ NW NE H-15n-8w, Dundee 3,741 ft., dry, TD 3,743 ft.

Newaygo County, Brooks Township: John F. Melvin 1 Hanson, NW NE NW 3-12n-12w, Traverse 2,494 ft., dry, TD 2,515 ft.

Oceana County, Colfax Township: Superior Oil Co. 1 Williams, SE NE NW 35-16n-15w, Traverse 2,017 ft., dry, TD 2,046 ft.

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LEGAL

8,232.74 ACRES of Tribal Indian lands and 11,267.26 ACRES of Allotted Indian lands located on the Uintah and Ouray Indian Reservation, Township 3 South, Ranges 1 and 2 West, Uintah Special Base and Meridian Survey, in Duchesne County, State of Utah, are being advertised for oil and gas lease sale, bids on which will be opened 2:00 P.M., December 10, 1952, at the office of Harry W. Gilmore, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from the office of the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency."

LEGAL

U.S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the NW¼NW¼ sec. 33, T. 17 S., R. 33 E., N.M.-P.M., New Mexico, within the known geologic structure of the Grayburg-Maljamar field, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p.m., Eastern Standard Time, on December 17, 1952, when bids will be opened. Details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Manager, Land and Survey Office, Santa Fe, New Mexico, or to this office. Marion Clawson, Director.

National TREATERS ELIMINATE BOILERS IN CANADIAN TANK BATTERY INSTALLATIONS

REDWATER: These two batteries handle two royalties, 4 wells into each.
5 2R-1000 Bbl. API Galvanized Coned Bottom National Bolted Steel Tanks with Aluminum Decks
2 2C, 2½' x 13' 125# National Separators
2 6' x 27½' "YCP" 15# National Emulsion Treaters

SITUATION: When National Tank first entered Canada in 1948, boilers were a "must" in all tank battery installations to maintain pour point in temperatures up to 60° below zero.

PROBLEM: Boiler installations were expensive. Water supplies were critical and because of extreme cold, continuous operation was required or careful draining of steam and water lines was necessary if lease was shut down for only a short length of time. To begin operations again meant costly refilling of water systems. Steam coils in storage tanks caused a large amount of evaporation of oil in tanks . . . as much as 3" in one 1000 Bbl. tank.

NATIONAL'S SOLUTION: Treater installation costs are about the same as boiler costs. National engineers helped their customers re-design piping hook-ups and circulating lines. They suggested putting the oil into the bottom of the tanks. In 1951, 98% of tank batteries were built with treater installations instead of boilers. Tanks have bottom fills. Pour point is maintained by circulating oil from tanks through treaters. Piping is arranged to allow hot oil to circulate through manifold, headers and separator. Treaters can be shut down for several days in extreme cold without draining water or for longer periods by draining water from treater only.

It's National

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

16-11-52

an **ACCO** product

The BRAND is mighty important

● This HAZARD brand on wire rope got started in 1846. It's a top brand today not because it goes back 106 years but because Hazard wire rope has kept on improving.

Hazard research and engineering has built more hours of useful work into ropes that carry this brand name. It has experimented with metals and alloys and every known lay. It is working harder than ever today improving the ropes that bear its name.

Hazard's especially proud of its LAY-SET Preformed WIRE ROPE. It lasts longer and costs less to use.

makers of ACCO Registered WIRE ROPE SLINGS

ACCO

TRADE MARK

HAZARD WIRE ROPE DIVISION
AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

In many areas-
a key to GREATER PROFITS!
AMERICAN IRON
Flash Welded
TOOL JOINTS
In many areas — a flash welded, unitized drill string provides advantages that make for greater profits! In these areas, you'll find that American Iron "Flash Welded" Tool Joints provide the key to the most effective, economical performance from this type drill string!
Three important factors make American Iron "Flash Welded" Tool Joints outstandingly dependable. They're DESIGNED RIGHT . . . MADE RIGHT . . . and INSTALLED RIGHT, with gigantic controlled surges of electricity welding tool joints to drill pipe — forming integral units!
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